IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MONTANA

UNITED STATES OF AMERICA, Plaintiff, v. PAUL BUNN and SNYDER LOGGING & LANDSCAPING, LLC, Defendants.	Civil Action No. 20-107-M-DLC-KLD

PARTIAL CONSENT DECREE

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WHEREAS, the Plaintiff, the United States of America, on behalf of the United States Environmental Protection Agency ("EPA"), filed the Complaint herein against Defendants Paul Bunn and Snyder Logging & Landscaping, LLC (collectively, "Defendants"), alleging that Defendants violated Section 301(a) of the Clean Water Act ("CWA"), 33 U.S.C. § 1311(a);

WHEREAS, this Partial Consent Decree ("Consent Decree") is intended to constitute a complete and final settlement of the United States' claims against Paul Bunn under the CWA set forth in the Complaint at a site located in Lincoln County, Montana (the "Site"), more particularly described as follows: a portion of land in the Yaak Valley of Lincoln County Montana, lying in H.E.S. 846 and located in Unsurveyed Section 2, Twp. 35 N., R. 33 W., P.M.M., being part of Lots 10A and 12A of Pleasant Meadows per Plat No. 7027, Lincoln County Records. The "Site" is located within the ordinary high water extent as depicted in Appendix 1.

WHEREAS, the United States and Mr. Bunn (the "Parties") agree that settlement of this case is in the public interest and that entry of this Consent Decree is the most appropriate means of resolving the United States' civil claims under the CWA against Mr. Bunn in this case; and

WHEREAS, the Court finds that this Consent Decree is a reasonable and fair settlement of the United States' claims against Mr. Bunn in this case, and that this

Consent Decree adequately protects the public interest in accordance with the CWA and all other applicable federal law.

THEREFORE, before the taking of any testimony upon the pleadings, without further adjudication of any issue of fact or law, and upon consent of the Parties hereto by their authorized representatives, it is hereby ORDERED, ADJUDGED and DECREED as follows:

I. JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of these actions and over the Parties pursuant to 28 U.S.C. §§ 1331, 1345, and 1355, and Section 309(b) of the CWA, 33 U.S.C. § 1319(b).

2. Venue is proper in the District of Montana pursuant to CWA Section 309(b), 33 U.S.C. § 1319(b), and 28 U.S.C. §§ 1391(b) and (c), because Mr. Bunn conducts business in this District, the subject property is located in this District, and the causes of action alleged in the Complaint arose in this District.

3. The Complaint states claims upon which relief can be granted pursuant to Sections 301, 309 and 404 of the CWA, 33 U.S.C. §§ 1311, 1319 and 1344.

II. APPLICABILITY

4. The obligations of this Consent Decree shall apply to and be binding upon the United States, its departments, and agencies, and upon Mr. Bunn, his agents, employees, and servants, and his successors and assigns and any person, firm, association or corporation who is, or will be, acting in concert or participation with Mr. Bunn whether or not such person has notice of this Consent Decree. In any action to enforce this Consent Decree against Mr. Bunn, Mr. Bunn shall not raise as a defense the failure of any of his agents, employees, and servants, and his successors or assigns or any person, firm or corporation acting in concert or participation with Mr. Bunn, to take any actions necessary to comply with the provisions of this Consent Decree.

5. The transfer of ownership or other interest in the Site (as described in Appendix 1 appended hereto and incorporated herein by reference) shall not alter or relieve Mr. Bunn of his obligation to comply with all of the terms of this Consent Decree. At least 15 days prior to the transfer of ownership or other interest in the Site, Mr. Bunn shall provide written notice and a true copy of this Consent Decree to his successors in interest and shall simultaneously notify EPA and the United States Department of Justice at the addresses specified in Section X below that such

notice has been given. As a condition to any such transfer, Mr. Bunn shall reserve all rights necessary to comply with the terms of this Consent Decree.

III. SCOPE OF CONSENT DECREE

6. This Consent Decree shall constitute a complete and final settlement of all civil claims for injunctive relief and civil penalties alleged in the Complaint against Mr. Bunn under CWA Section 301 concerning the Site.

7. It is the express purpose of the Parties in entering this Consent Decree to further the objectives set forth in CWA Section 101, 33 U.S.C. § 1251. All plans, studies, construction, remedial maintenance, monitoring programs, and other obligations in this Consent Decree or resulting from the activities required by this Consent Decree shall have the objective of causing Mr. Bunn to achieve and maintain full compliance with, and to further the purposes of, the CWA.

8. The United States and its departments and agencies covenant not to sue or take administrative action against Paul Bunn pursuant to Section 309 of the Clean Water Act, 33 U.S,C. § 1319, for any civil violations alleged in the Complaint.

9. Paul Bunn, his agents, employees, successors and assigns covenant not to sue or take administrative action against the United States, its departments and agencies arising from the civil violations alleged in the Complaint.

10. Except as in accordance with this Consent Decree, Mr. Bunn and his agents, successors and assigns are enjoined from discharging any pollutant into waters of the United States, unless such discharge complies with the provisions of the CWA and its implementing regulations.

11. The Parties acknowledge that Nationwide Permit 32, found at 82 Fed. Reg. 1,860, 1,992 (Jan. 6, 2017), authorizes any fill that was placed as of December 31, 2013, in the areas identified in Appendix 2, to remain in place, subject to the conditions provided in the Nationwide Permit and this Consent Decree. The Parties further acknowledge that Nationwide Permit 32 authorizes the discharge of dredged or fill material insofar as such discharge is necessary to complete the work required to be performed pursuant to this Consent Decree. Any such discharge of dredged or fill material necessary for work required by this Consent Decree shall be subject to the conditions of the Nationwide Permit and this Consent Decree.

12. This Consent Decree is not and shall not be interpreted to be a permit or modification of any existing permit issued pursuant to Sections 402 or 404 of the CWA, 33 U.S.C. §§ 1342 or 1344, or any other law. Nothing in this Consent Decree shall limit the ability of the United States Army Corps of Engineers to issue, modify, suspend, revoke or deny any individual permit or any nationwide or

regional general permit, nor shall this Consent Decree limit the EPA's ability to exercise its authority pursuant to Section 404(c) of the CWA, 33 U.S.C. § 1344(c).

13. This Consent Decree in no way affects or relieves Mr. Bunn of his responsibility to comply with any applicable federal, state, or local law, regulation or permit.

14. This Consent Decree in no way affects the rights of the United States as against any person not a party to this Consent Decree.

15. The United States and Mr. Bunn reserve any and all legal and equitable remedies available to enforce the provisions of this Consent Decree and applicable law.

16. Nothing in this Consent Decree shall constitute an admission of fact or law by any Party.

IV. SPECIFIC PROVISIONS

CIVIL PENALTIES

17. As part of this settlement, Mr. Bunn shall pay a civil penalty to the United States in the amount of Fifty Thousand Dollars ($50,000), within 30 days of entry of this Consent Decree.

18. Mr. Bunn shall make the above-referenced payment by FedWire Electronic Funds Transfer ("EFT" or wire transfer) to the U.S. Department of

Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number (2020A59788), EPA Region 8 and the DOJ case number (90-5-1-1-20880). Payment shall be made in accordance with instructions provided to Mr. Bunn by the Financial Litigation Unit of the United States Attorney's Office for the District of Montana. Any payments received by the Department of Justice after 4:00 P.M. (Eastern Time) will be credited on the next business day.

19. Upon payment of the civil penalty set forth in Paragraph 17, Mr. Bunn shall provide written notice, at the addresses specified in Section X of this Consent Decree, that such payment was made in accordance with Paragraphs 17 and 18.

20. Penalty payments under this Consent Decree pursuant to this Section or Section IX (Stipulated Penalties) are penalties within the meaning of Section 162(f)(1) of the Internal Revenue Code, 26 U.S.C. § 162(f)(1), and 26 C.F.R. § 1.162-21(a)(3)(i), and Mr. Bunn shall not deduct any penalties paid under this Decree pursuant to this Section or Section IX (Stipulated Penalties) in calculating their federal income tax.

RESTORATION, MITIGATION AND PRESERVATION

21. Mr. Bunn shall perform the restoration project under the terms and conditions stated in Appendix 2, appended hereto and incorporated herein by reference.

22. Upon completion of the terms and conditions of Appendix 2, Mr. Bunn shall not mow, cut, clear, cultivate, dredge, excavate, farm, fill, dewater, drain or otherwise disturb in any manner whatsoever any location identified in Sheet 7 of Appendix A to Appendix 2, except to control weeds using herbicides that are labeled as 'safe for aquatic' environments or except as approved by EPA, which approval shall not be unreasonably withheld.

23. To ensure that all parcels of land identified in Appendix 1—the Site — remain undisturbed, Mr. Bunn shall, within 15 days of entry of this Consent Decree, record a certified copy of this Consent Decree with the Clerk and Recorders Office, in Lincoln County, Montana. Thereafter, each deed, title, or other instrument conveying an interest in Lots 10A or Lot 12A of Pleasant Meadows per Plat No. 7027 shall contain a notice stating that the property is subject to this Consent Decree and shall reference the recorded location of the Consent Decree and Paragraph 22 of the Consent Decree.

24. For purposes of the identification requirement in Section 162(f)(2)(A)(ii) of the Internal Revenue Code, 26 U.S.C. § 162(f)(2)(A)(ii), and 26 C.F.R. § 162-21(b)(2)(iii)(A), performance of Paragraphs 21 and 22 are restitution, remediation, or required to come into compliance with the law.

V. NOTICES AND OTHER SUBMISSIONS

25. Within 30 days after the deadline for completing the work set forth in Appendix 2 of this Consent Decree, Mr. Bunn shall provide the United States with written notice, at the addresses specified in Section X of this Consent Decree, of whether or not the work has been completed.

26. If the required work has been completed, the notice shall specify the date when it was completed, and explain the reasons for any delay in completion beyond the scheduled time for such completion required by the Consent Decree. If the United States determines that any work has not been completed by Mr. Bunn, or has not been completed within the scheduled time, it shall provide Mr. Bunn with written notice describing the work not completed, and stating the scheduled time the United States determined to be applicable to the work described, at the addresses specified in Section X of this Consent Decree.

27. In all notices, documents or reports submitted to the United States pursuant to this Consent Decree, Mr. Bunn shall certify such notices, documents and reports as follows:

> I certify under penalty of law that the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

VI. RETENTION OF RECORDS AND RIGHT OF ENTRY

28. Until termination of this Consent Decree, Mr. Bunn shall preserve and retain all records and documents now in his possession or control or which come into his possession or control that relate in any manner to the performance of the tasks in Appendix 2, regardless of any retention policy to the contrary. Until termination of this Consent Decree, Mr. Bunn shall also instruct his contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the tasks in Appendix 2.

29. At the conclusion of the document retention period, Mr. Bunn shall notify the United States at least 90 days prior to the destruction of any such records or documents, and, upon request by the United States, Mr. Bunn shall deliver any such records or documents to EPA.

30. A. Until termination of this Consent Decree, the United States and its authorized representatives and contractors shall have authority at all reasonable times to enter the Site to:

1) Monitor the activities required by this Consent Decree;

2) Verify any data or information submitted to the United States;

3) Obtain samples;

4) Inspect and evaluate Mr. Bunn's restoration and/or mitigation activities; and

5) Inspect and review any records required to be kept under the terms and conditions of this Consent Decree and the CWA.

B. This provision of this Consent Decree is in addition to, and in no way limits or otherwise affects, the statutory authorities of the United States to conduct inspections, to require monitoring and to obtain information from Mr. Bunn as authorized by law.

VII. DISPUTE RESOLUTION

31. Any dispute that arises with respect to the meaning or requirements of this Consent Decree shall be, in the first instance, the subject of informal negotiations between the United States and Mr. Bunn to attempt to resolve such dispute. The period for informal negotiations shall not extend beyond 30 days

beginning with written notice by one Party to the other affected Party that a dispute exists, unless agreed to in writing by those Parties. If a dispute between the United States and Mr. Bunn cannot be resolved by informal negotiations, then the position advanced by the United States shall be considered binding unless, within 14 days after the end of the informal negotiations period, Mr. Bunn files a motion with the Court seeking resolution of the dispute. The motion shall set forth the nature of the dispute and a proposal for its resolution. The United States shall have 30 days to respond to the motion and propose an alternate resolution. In resolving any such dispute, the Court will determine whether Mr. Bunn's position will achieve compliance with the terms and conditions of this Consent Decree and the CWA.

32. If the United States believes that a dispute is not a good faith dispute, or that a delay would pose or increase a threat of harm to the public or the environment, it may move the Court for a resolution of the dispute prior to the expiration of the 30-day period for informal negotiations. Mr. Bunn shall have 14 days to respond to the motion and propose an alternate resolution. In resolving any such dispute, the Court will determine whether Mr. Bunn's position will achieve compliance with the terms and conditions of this Consent Decree and the CWA.

33. The filing of a motion asking the Court to resolve a dispute shall not extend or postpone any obligation of Mr. Bunn under this Consent Decree, except as provided in Paragraph 41 below regarding payment of stipulated penalties.

VIII. FORCE MAJEURE

34. Mr. Bunn shall perform the actions required under this Decree within the time limits set forth or approved herein, unless the performance is prevented or delayed solely by events which constitute a Force Majeure event. A Force Majeure event is defined as any event arising from causes beyond the control of Mr. Bunn, including his employees, agents, consultants and contractors, which could not be overcome by due diligence and which delays or prevents the performance of an action required by this Consent Decree within the specified time period. A Force Majeure event does not include, *inter alia*, increased costs of performance, changed economic circumstances, changed labor relations, normal precipitation or normal climate events in Lincoln County, Montana, changed circumstances arising out of the sale, lease or other transfer or conveyance of title or ownership or possession of a site, or failure to obtain federal, state or local permits.

35. If Mr. Bunn believes that a Force Majeure event has affected Mr. Bunn's ability to perform any action required under this Consent Decree, Mr. Bunn shall notify the United States in writing within 21 calendar days after the event at

the addresses listed in Section X. Such notice shall include a discussion of the following:

A. what action has been affected;

B. the specific cause(s) of the delay;

C. the length or estimated duration of the delay; and

D. any measures taken or planned by Mr. Bunn to prevent or minimize the delay and a schedule for the implementation of such measures.

Mr. Bunn may also provide to the United States any additional information that he deems appropriate to support his conclusion that a Force Majeure event has affected his ability to perform an action required under this Consent Decree. Failure to provide timely and complete notification to the United States shall constitute a waiver of any claim of Force Majeure as to the event in question.

36. If the United States determines that the conditions constitute a Force Majeure event, then the deadline for the affected action shall be extended by the amount of time of the delay caused by the Force Majeure event. Mr. Bunn shall coordinate with EPA to determine when to begin or resume the operations that had been affected by any Force Majeure event.

37. If the Parties are unable to agree whether the conditions constitute a Force Majeure event, or whether the length of time for fulfilling the provision of the

Consent Decree at issue should be extended, any Party may seek a resolution of the dispute under the procedures in Section VII of this Consent Decree.

38. Mr. Bunn shall bear the burden of proving (1) that the noncompliance at issue was caused by circumstances entirely beyond the control of Mr. Bunn and any entity controlled by Mr. Bunn, including his contractors and consultants; (2) that Mr. Bunn or any entity controlled by Mr. Bunn could not have foreseen and prevented such noncompliance; and (3) the number of days of noncompliance that were caused by such circumstances.

IX. STIPULATED PENALTIES

39. After entry of this Consent Decree, if Mr. Bunn fails to timely fulfill any requirement of the Consent Decree (including Appendix 2), Mr. Bunn shall pay a stipulated penalty to the United States for each violation of each requirement of this Consent Decree in the amount of $100.00 per day, commencing on the 61st day of non-compliance and continuing to the date of compliance. Such payments shall be made without demand by the United States on or before the last day of the month following the month in which the stipulated penalty accrued.

40. Any disputes concerning the amount of stipulated penalties, or the underlying violation that gives rise to the stipulated penalties, that cannot be resolved by the Parties pursuant to the Dispute Resolution provisions in Section VII

and/or the Force Majeure provisions in Section VII shall be resolved upon motion to this Court as provided in Paragraphs 31 and 32.

41. The filing of a motion requesting that the Court resolve a dispute shall stay Mr. Bunn's obligation to pay any stipulated penalties with respect to the disputed matter pending resolution of the dispute. Notwithstanding the stay of payment, stipulated penalties shall continue to accrue from the first day of any failure or refusal to comply with any term or condition of this Consent Decree. In the event that Mr. Bunn does not prevail on the disputed issue, stipulated penalties shall be paid by Mr. Bunn as provided in this Section.

42. To the extent Mr. Bunn demonstrates to the Court that a delay or other non-compliance was due to a Force Majeure event (as defined in Paragraph 34 above) or otherwise prevail on the disputed issue, the Court shall excuse the stipulated penalties for that delay or non-compliance.

43. Mr. Bunn shall make any payment of a stipulated penalty by FedWire Electronic Funds Transfer ("EFT" or wire transfer) to the U.S. Department of Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number (2020A59788), EPA Region 8 and the DOJ case number (90-5-1-1-20880). Payment shall be made in accordance with instructions provided to Mr. Bunn by the Financial Litigation Unit of the United States

Attorney's Office for the District of Montana. Any payments received by the Department of Justice after 4:00 P.M. (Eastern Time) will be credited on the next business day. Further, upon payment of any stipulated penalties, Mr. Bunn shall provide written notice, at the addresses specified in Section X of this Decree.

X. ADDRESSES

44. All notices and communications required under this Consent Decree shall be made by U.S. mail or email to the Parties through each of the following persons and addresses:

A. TO EPA:

(1) Margaret J. Livingston
Assistant Regional Counsel
United States Environmental Protection Agency
Region 8
1595 Wynkoop Street (8RC-LEB-RES)
Denver CO 80202-1129
Livingston.peggy@epa.gov

(2) Michael Boeglin
Manager, NPDES and Wetlands Enforcement Section
USEPA Region 8
1595 Wynkoop St. (8ENF-W-NW)
Denver, CO 80202
Boeglin.michael@epa.gov

B. TO THE UNITED STATES DEPARTMENT OF JUSTICE

Alan Greenberg, Attorney
Environmental Defense Section
Environment and Natural Resources Division
U.S. Department of Justice
999 18th Street, Suite 370
Denver CO 80202
Alan.greenberg@usdoj.gov

D. TO MR. BUNN:

Mr. Paul Bunn
1015 West 9th Street
Libby, MT 59923
77pcbunn@gmail.com

Mr. Douglas C. Allen
1010 Halo Drive
Troy, MT 59935
dougcallen77@gmail.com

XI. COSTS OF SUIT

45. Each Party to this Consent Decree shall bear its own costs and attorneys' fees in this action.

XII. PUBLIC COMMENT

46. The Parties acknowledge that after the lodging and before the entry of this Consent Decree, final approval by the United States is subject to the requirements of 28 C.F.R. § 50.7, which provides for public notice and comment. The United States reserves the right to withhold or withdraw its consent to the entry of this Consent Decree if the comments received disclose facts which lead the United States to conclude that the proposed judgment is inappropriate, improper, or inadequate. Mr. Bunn agrees not to withdraw from, oppose entry of, or to challenge any provision of this Consent Decree, unless the United States has notified Mr. Bunn in writing that it no longer supports entry of the Consent Decree.

XIII. CONTINUING JURISDICTION OF THE COURT

47. This Court shall retain jurisdiction over this action in order to enforce or modify the Consent Decree consistent with applicable law or to resolve all disputes arising hereunder as may be necessary or appropriate for construction or execution of this Consent Decree. During the pendency of the Consent Decree, any Party may apply to the Court for any relief necessary to construe and effectuate the Consent Decree.

XIV. MODIFICATION

48. Upon its entry by the Court, this Consent Decree shall have the force and effect of a final judgment. Any modification of this Consent Decree shall be in writing, and shall not take effect unless signed by both the United States and Mr. Bunn and approved by the Court.

XV. TERMINATION

49. Except for Paragraph 22, this Consent Decree may be terminated by either of the following:

A. Mr. Bunn and the United States may at any time make a joint motion to the Court for termination of this Decree or any portion of it; or

B. Mr. Bunn may make a unilateral motion to the Court to terminate this Decree after each of the following has occurred:

1. Mr. Bunn has obtained and maintained compliance with all provisions of this Consent Decree for twelve (12) consecutive months;

2. Mr. Bunn has paid all penalties and other monetary obligations hereunder and no penalties or other monetary obligations are outstanding or owed to the United States;

3. Mr. Bunn has certified compliance pursuant to subparagraphs 1 and 2 above to the Court and both Parties; and

4. Within 45 days of receiving such certification from the Mr. Bunn, EPA has not contested in writing that such compliance has been achieved. If EPA disputes Mr. Bunn's full compliance, this Consent Decree shall remain in effect pending resolution of the dispute by the Parties or the Court.

IT IS SO ORDERED.

Dated and entered this 31st day of August, 2021.

Dana L. Christensen, District Judge
United States District Court

ON BEHALF OF THE UNITED STATES:

Jean E. Williams
Acting Assistant Attorney General
Environment and Natural Resources Division

s/ Alan D. Greenberg Dated: June 29, 2021

_____

Alan D. Greenberg, Attorney Environmental Defense Section Environment and Natural Resources Division U.S. Department of Justice
999 18th Street, Suite 370
Denver, CO 80202

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

MARGARET LIVINGSTON Digitally signed by MARGARET LIVINGSTON Date: 2021.06.15 09:40:20 -06'00' Dated:

MARGARET J. LIVINGSTON
Senior Assistant Regional Counsel
Legal Enforcement Branch
U.S. Environmental Protection Agency, Region 8

SUZANNE BOHAN Digitally signed by SUZANNE BOHAN Date: 2021.06.15 17:52:50 -06'00' Dated:

SUZANNE J. BOHAN
Enforcement and Compliance Assurance Division
U.S. Environmental Protection Agency, Region 8

DEBRA THOMAS Digitally signed by DEBRA THOMAS Date: 2021.06.23 11:59:04 -06'00' Dated:

DEBRA H. THOMAS
Acting Regional Administrator
U.S. Environmental Protection Agency, Region 8

KENNETH SCHEFSKI Digitally signed by KENNETH SCHEFSKI Date: 2021.06.15 20:49:01 -06'00' Dated:

KENNETH C. SCHEFSKI
Regional Counsel
U.S. Environmental Protection Agency, Region 8

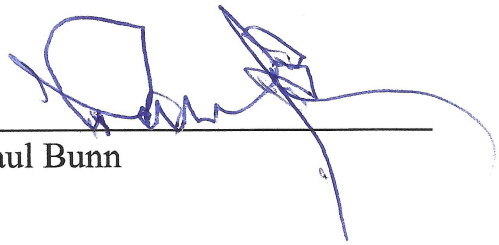
Nathan Mark Pollins

Digitally signed by Nathan Mark Pollins
Date: 2021.06.23 13:25:46 -04'00'

Dated:

MARK POLLINS
Director, Water Enforcement Division
Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20004

FOR DEFENDANT PAUL BUNN



Paul Bunn

Dated: June 3, 2021

APPENDIX 1

to Partial Consent Decree

United States v. Paul Bunn, et al.

Civil Action No. 20-107-M-DLC-KLD

LINCOLN COUNTY, MONTANA

AMENDED PLAT OF:

Lots 8, 9, 10, 11, & 12 of Pleasant Meadow on the Yaak River
BOUNDARY ADJUSTMENT
In a portion of H.E.S. 846, Unsurveyed Twp. 35 N., R. 33 W., P.M.M.

For: Dario A. & Mary Ann Scarabosio Date: May 2009

Scott C. & Jennifer L. Edminster

DESCRIPTION OF LOT 8A

A tract of land located in the Yaak Valley of Lincoln County, lying in H.E.S. 846 in Unsurveyed Twp. 35 N., R. 33 W., P.M.M., being Lot 8 and a portion of Lot 9, of Pleasant Meadow on the Yaak River per Plat No. 2532, containing 1.15 acres more or less and more particularly described as follows:

Beginning at a 3/4 inch dia. pipe marking the northeast corner of Lot 8 of Pleasant Meadow on the Yaak River; thence, S15°59'42"E 268.78 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence continuing, S15°59'42"E 47.28± feet to a computed point located on the north bank of the Yaak River; thence downstream, S48°33'06"W 140.23 feet to a computed point; thence, N21°09'55"W 43.88± feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence continuing, N21°09'55"W 334.02 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence, N74°01'01"E 50.72 feet to a computed point; thence continuing, N74°01'01"E 109.95 feet to the point of beginning.

The aforedescribed Lot 8A contains 1.15 acres more or less and is subject to and together with all appurtenant easements of record.

DESCRIPTION OF LOT 10A

A tract of land located in the Yaak Valley of Lincoln County, lying in H.E.S. 846 in Unsurveyed Twp. 35 N., R. 33 W., P.M.M., being Lot 10 and a portion of Lot 11, of Pleasant Meadow on the Yaak River per Plat No. 2532, containing 5.40 acres more or less and more particularly described as follows:

Beginning at a 3/4 inch dia. iron pipe which marks the northeast corner of Lot 11 of Pleasant Meadow on the Yaak River per Plat No. 2532; thence, S32°32'37"W 178.13 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence, S29°28'10"W 464.58 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence continuing, S29°28'10"W 43.80± feet to a computed point located on the north bank of the Yaak River; thence upstream, S56°26'59"E 153.73 feet to a computed point; thence, N67°23'22"E 225.86 feet to a computed point; thence, N48°33'06"E 408.79 feet to a computed point; thence, N21°09'55"W 43.88± feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence, N21°09'55"W 334.02 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S located on the south right-of-way line of State Highway No. 508; thence, S74°01'01"W 60.13 feet to a 3/4 inch dia. iron pipe having a radial bearing of N17°40'08"W; thence on the arc of a curve to the right, a distance of 104.45 feet, turning through a delta angle of 18°08'07", and having a radius of 330.00 feet to the point of beginning.

The aforedescribed Lot 10A contains 5.40 acres more or less and is subject to and together with all appurtenant easements of record.

DESCRIPTION OF LOT 12A

A tract of land located in the Yaak Valley of Lincoln County, lying in H.E.S. 846 in Unsurveyed Twp. 35 N., R. 33 W., P.M.M., being Lot 12 and a portion of Lot 11, of Pleasant Meadow on the Yaak River per Plat No. 2532, containing 6.26 acres more or less and more particularly described as follows:

Beginning at a 3/4 inch dia. iron pipe which marks the northeast corner of Lot 11 of Pleasant Meadow on the Yaak River per Plat No. 2532; thence, S32°32'37"W 178.13 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence, S29°28'10"W 464.58 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence continuing, S29°28'10"W 43.80± feet to a computed point located on the north bank of the Yaak River; thence downstream, N56°26'59"W 292.51 feet to a computed point; thence, N33°37'34"W 245.14 feet to a computed point; thence, S77°09'49"W 171.78 feet to a computed point; thence, N64°47'41"W 58.85 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S located on the south right-of-way of State Highway No. 508; thence, N49°08'46"E 111.65 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence, N71°43'04"E 694.49 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S located on said south right-of-way; thence, S71°23'01"E 105.14 feet to a 5/8 inch dia. rebar capped K.E.D. 4975-S; thence on the arc of a curve to the left, a distance of 104.54 feet, turning through a delta angle of 18°09'00", and having a radius of 330.00 feet, to the point of beginning.

The aforedescribed Lot 12A contains 6.26 acres more or less and is subject to and together with all appurtenant easements of record.

DISCLAIMER

THIS DOCUMENT WAS COMPLIED USING SOFTWARE TO DIGITALLY OVERLAY AN EXISTING SURVEY DOCUMENT (PLAT NO. 7027) AND A DOCUMENT PROVIED BY RESOURCE CONSULTANTS INC.

STATE OF MONTANA
County of Lincoln

On this 15 day of JUNE, 2009 A.D. before me, a Notary Public, in and for the State of Montana, personally appeared known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same.

Notary Public — My Commission Expires 9/15/2012

CERTIFICATE OF ADJUSTMENT/ PURPOSE

We, Dario A. & Mary Ann Scarabosio, Scott & Jennifer Edminster, & Thomas & Jeanne Neilson, the undersigned property owners, do hereby certify that the purpose of this survey is to relocate a common boundary between adjoining lots within a platted subdivision; therefore this survey is exempt from review as a subdivision being completed pursuant to Section 76-3-207(1)(d) M.C.A., which states: "for five or fewer lots within a platted subdivision, relocation of common boundaries and aggregation of lots;"

Dated this 15 day of JUNE, 2009 A.D.

Dario A. & Mary Ann Scarabosio

Scott C. & Jennifer L. Edminster

STATE OF MONTANA
County of Lincoln

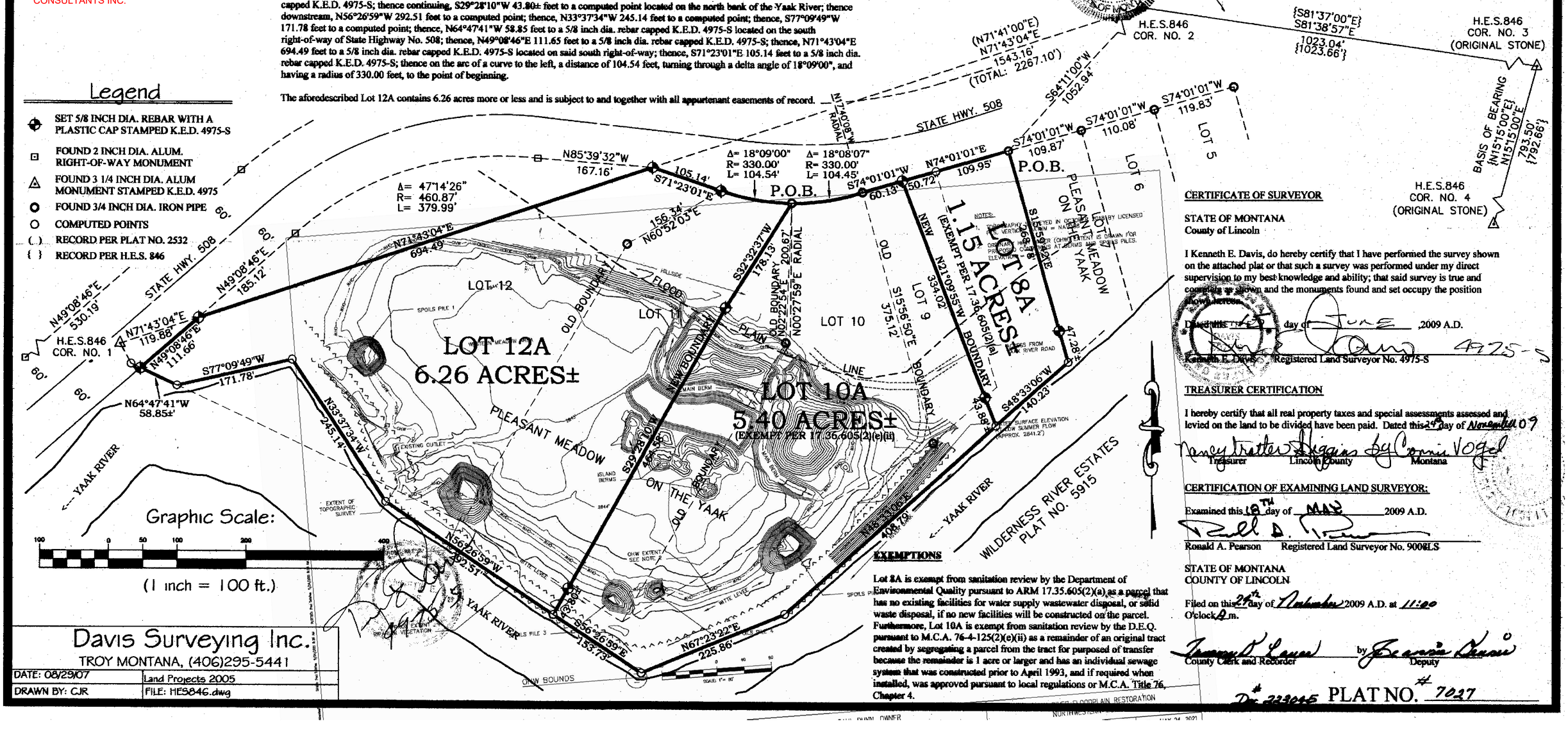
On this 15 day of JUNE, 2009 A.D. before me, a Notary Public, in and for the State of Montana, personally appeared Dario A. & Mary Ann Scarabosio, known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same.

Notary Public — My Commission Expires 9/15/2012

STATE OF MONTANA
County of Lincoln

On this 15 day of JUNE, 2009 A.D. before me, a Notary Public, in and for the State of Montana, personally appeared Scott C. & Jennifer L. Edminster, known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same.

Notary Public — My Commission Expires



EXEMPTIONS

Lot 8A is exempt from sanitation review by the Department of Environmental Quality pursuant to ARM 17.35.605(2)(a) as a parcel that has no existing facilities for water supply wastewater disposal, or solid waste disposal, if no new facilities will be constructed on the parcel. Furthermore, Lot 10A is exempt from sanitation review by the D.E.Q. pursuant to M.C.A. 76-4-125(2)(e)(ii) as a remainder of an original tract created by segregating a parcel from the tract for purposed of transfer because the remainder is 1 acre or larger and has an individual sewage system that was constructed prior to April 1993, and if required when installed, was approved pursuant to local regulations or M.C.A. Title 76, Chapter 4.

CERTIFICATE OF SURVEYOR

STATE OF MONTANA
County of Lincoln

I Kenneth E. Davis, do hereby certify that I have performed the survey shown on the attached plat or that such a survey was performed under my direct supervision to my best knowledge and ability; that said survey is true and complete as shown and the monuments found and set occupy the position shown hereon.

Dated this 24 day of JUNE, 2009 A.D.

Kenneth E. Davis — Registered Land Surveyor No. 4975-S

TREASURER CERTIFICATION

I hereby certify that all real property taxes and special assessments assessed and levied on the land to be divided have been paid. Dated this 24th day of November 09

Nancy Trotter Higgins by Connie Vogel
Treasurer Lincoln County Montana

CERTIFICATION OF EXAMINING LAND SURVEYOR:

Examined this 18TH day of MAY 2009 A.D.

Ronald A. Pearson Registered Land Surveyor No. 9008LS

STATE OF MONTANA
COUNTY OF LINCOLN

Filed on this 24th day of November 2009 A.D. at 11:00 O'clock A.m.

County Clerk and Recorder — by Deputy

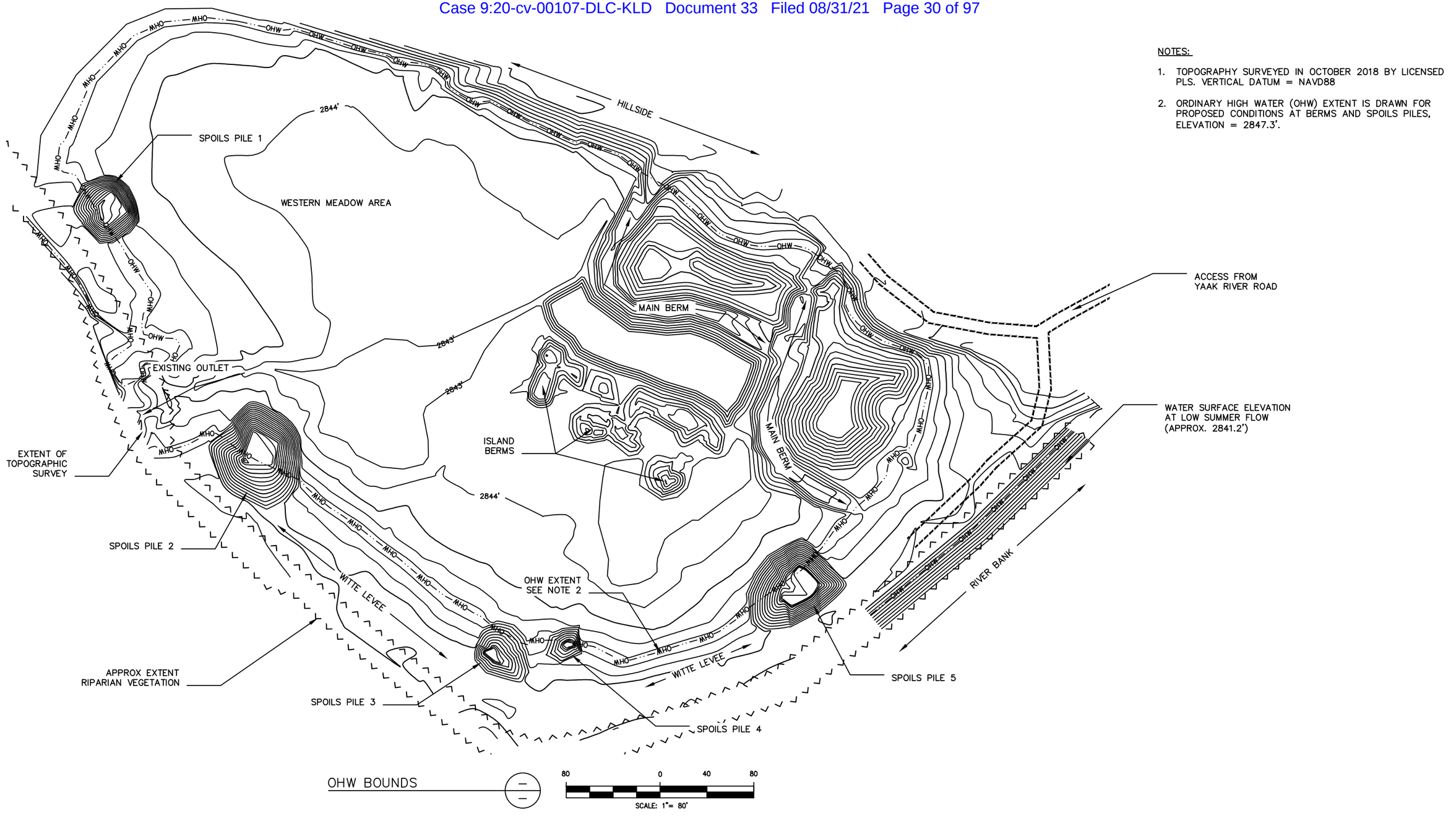
Doc # 229045 PLAT NO. # 7027

Davis Surveying Inc.
TROY MONTANA, (406)295-5441

DATE: 08/29/07	Land Projects 2005
DRAWN BY: CJR	FILE: HES846.dwg

NOTES:

1. TOPOGRAPHY SURVEYED IN OCTOBER 2018 BY LICENSED PLS. VERTICAL DATUM = NAVD88
2. ORDINARY HIGH WATER (OHW) EXTENT IS DRAWN FOR PROPOSED CONDITIONS AT BERMS AND SPOILS PILES, ELEVATION = 2847.3'.



0 1' BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

MONTANA PAUL E. DEVRIES No. 61770 PE LICENSED PROFESSIONAL ENGINEER MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

ORDINARY HIGH WATER EXTENT

DATE: MAY 24, 2021
SHEET: —
REV:

FILED IN: C:\Users\pdevries\PROJECTS\2219 Yaak\Yaak100PCT-HoleedowFill.dwg SAVED: Paul DeVries 5/24/2021 8:26 AM PLOTTED: Paul DeVries 5/24/2021 8:28 AM

APPENDIX 2

to Partial Consent Decree

United States v. Paul Bunn, et al.

Civil Action No. 20-107-M-DLC-KLD

Yaak River Bunn Property
Floodplain Restoration Design Report and Monitoring Plan

Prepared for:

Paul C. Bunn
123 Bothman Drive
Libby, MT 59923

Prepared by

Kleinschmidt Associates

15250 NE 95th Street
Redmond, WA 98052

March 2021

Yaak River Bunn Property
Floodplain Restoration Design Report and Monitoring Plan

Prepared for:

Paul C. Bunn
123 Bothman Drive
Libby, MT 59923

Prepared by:

Paul DeVries, PhD, PE, CFP

Kleinschmidt Associates
15250 NE 95th Street
Redmond, WA 98052

March 2021

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1 BACKGROUND

R2 Resource Consultants, Inc. (R2), now a subsidiary of Kleinschmidt Associates, was contracted by P.C. Bunn (Owner) to provide wetlands restoration design support services associated with restoring a floodplain area of the Yaak River, Montana on the Owner's property, which is located on river-right, looking downstream (Figure 1). The project site floodplain was formerly a riparian and wetland complex with an elevated floodplain channel periodically connecting the floodplain with the river via a historically constructed notch (= 'pre-disturbance' condition; Figure 2). River water would flow onto the floodplain through the notch during elevated spring snowmelt runoff, and drain back as the river flow receded.

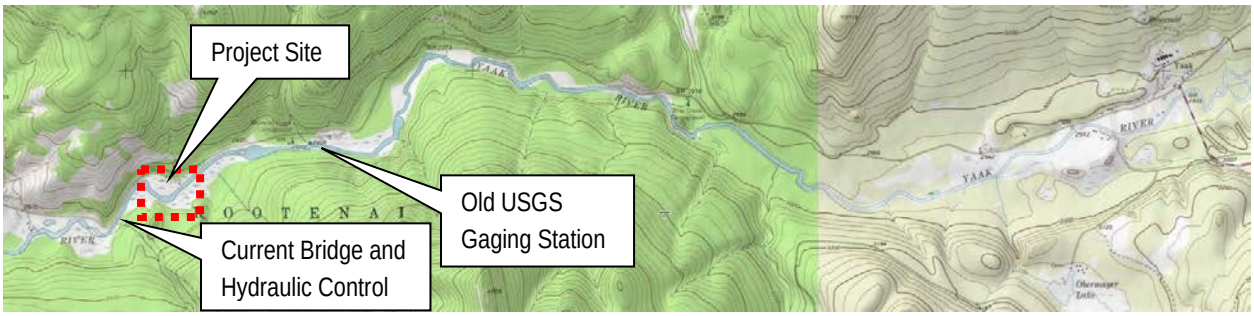

Figure 1. Location of project site, Yaak River near Yaak, Montana. Flow is from right to left.

The project site previously experienced significant disturbance more than 90 years ago (Lindsey 2019). Topographic survey data indicate an old man-made levee extends along the right riverbank to the channel draining the floodplain. Based on a 1932 aerial photograph, it is suspected that the levee was constructed prior to that time in conjunction with modification of the floodplain topography; a comparable levee was constructed on the opposing bank as well and is still there (Figure 3). In addition, the notch and a floodplain channel appear to be the remains of a drainage ditch visible within the disturbed area in the 1932 photograph. A section of the historical public road was cut and filled into the north side of the floodplain. A bridge crossing the Yaak River and a structure on the opposite floodplain, visible in 1932 were taken out before a 1947 aerial photograph was taken. There were also reportedly some commercial fish hatchery rearing ponds on the property during the early 1930s, and they are visible in the 1947 photograph (Figure 3). Over time, a floodplain wetlands community developed on the project site after these initial disturbances. Figure 2 depicts a distinct area interpreted from aerial photographs to be possible wetlands vegetation that can be seen in the upper photograph, the outer edge of which corresponds approximately to elevation 2845' (NAVD88). The area appears to overlap with the area seen to be disturbed in the 1932 photograph (Figure

3). The location of the largest relic pond is also discernable. The notch and floodplain channel remained the primary conveyance path for floodplain connectivity on the site.

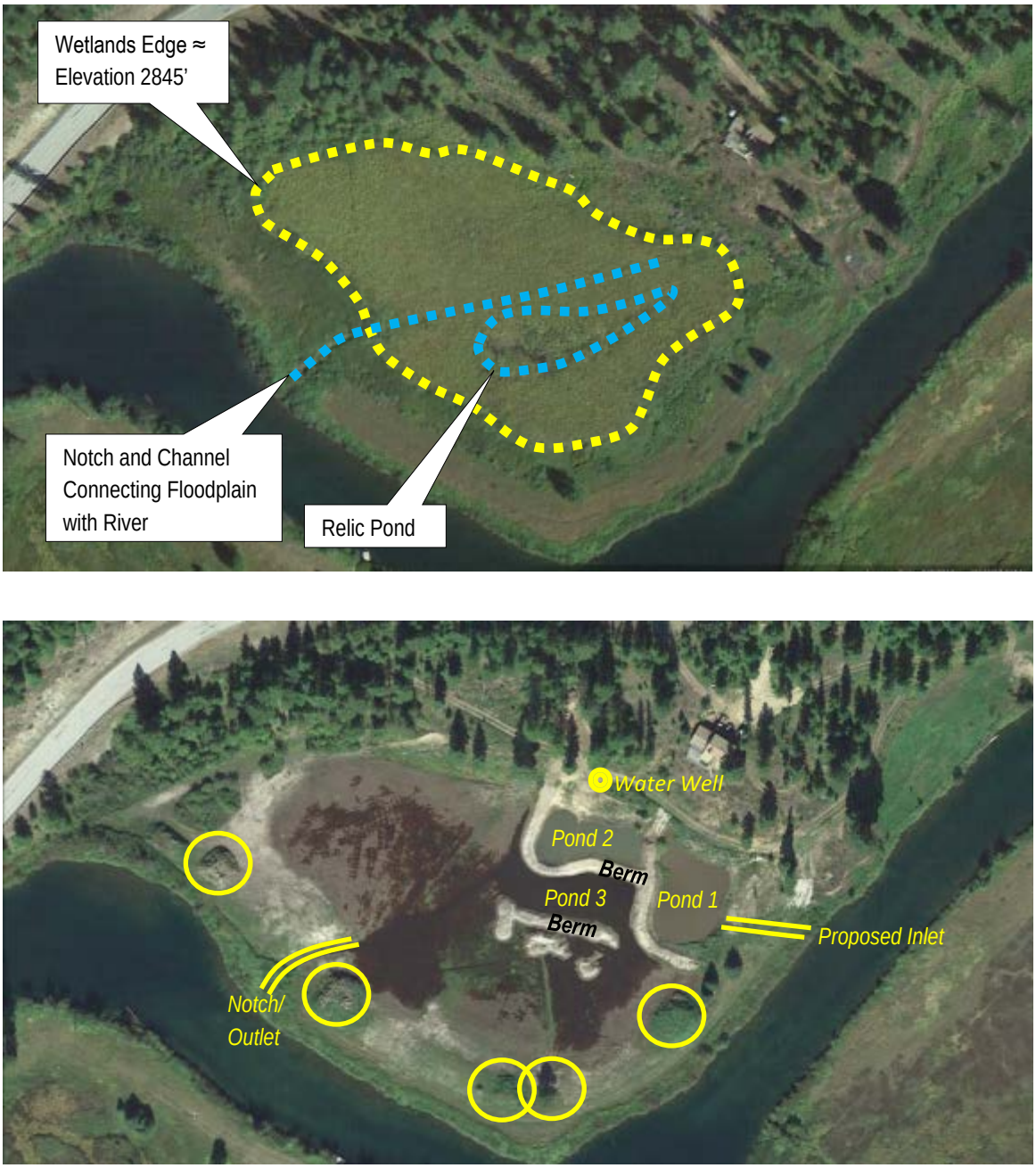

Figure 2. Aerial photographs of site before (2012; top) and after (2014; bottom) floodplain excavation activities. Relevant features referred to in the text are indicated, including historic extent of wetland vegetation inferred from color changes in the aerial photograph, three excavated ponds and surrounding berms, location of outlet connecting the floodplain hydraulically to the river, five main spoils piles (circled), and general location of a proposed high flow river inlet channel.

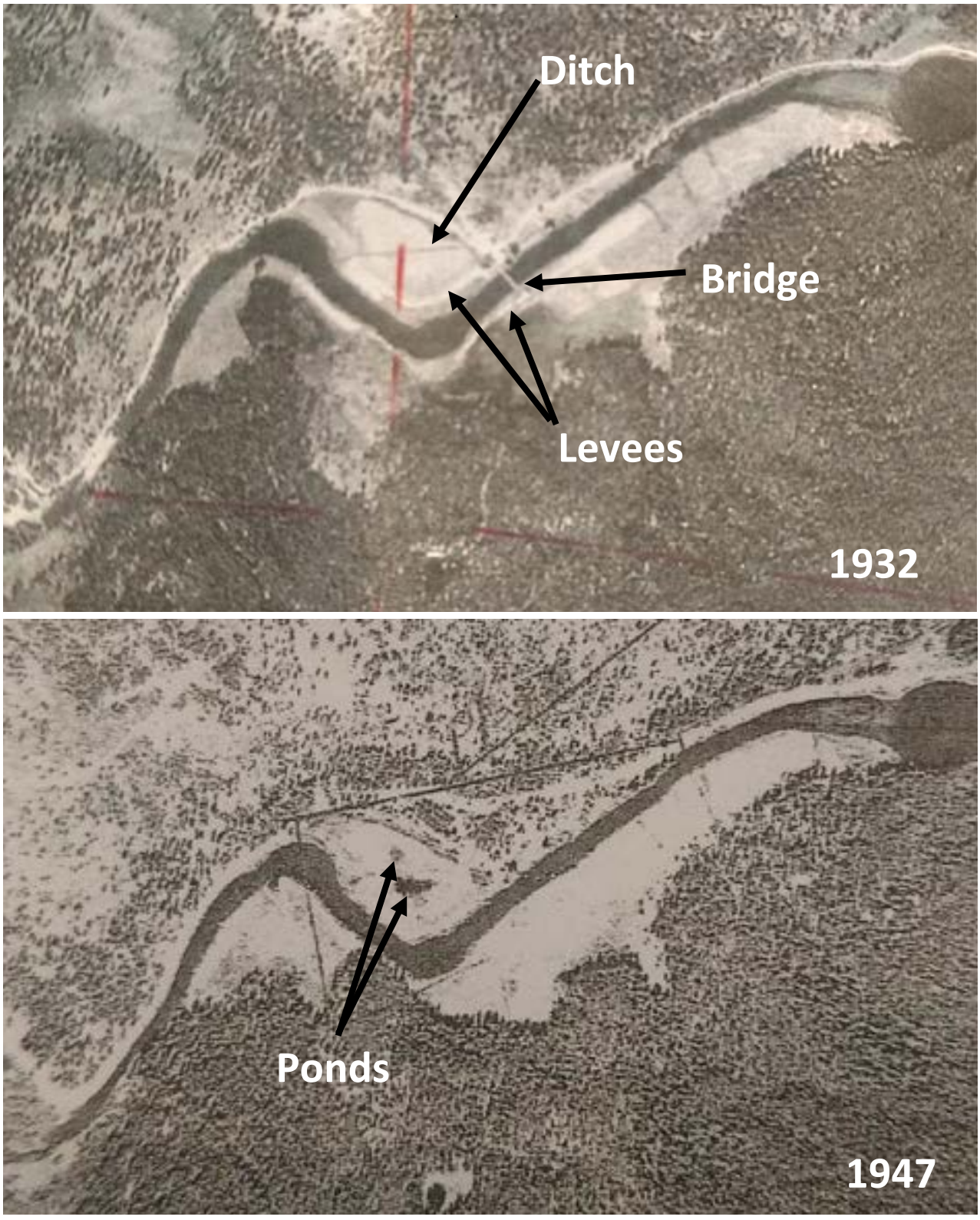

Figure 3. Aerial photographs of site showing historic disturbance features on project site floodplain and riverbanks. Photographs and dates provided by T. Lindsey.

The Owner purchased the property in May 2013, and contends that he initiated earthwork on the floodplain in late June 2013 after consulting with Lincoln County concerning permitting requirements and receiving an email on June 5, 2013 from the County Floodplain Administrator that she would not require a permit for what was proposed. The ensuing earthwork involved excavating three ponds, and scalping of the floodplain. Two of the ponds are presently isolated by raised berms, whereas the third is connected via surface water to the outlet notch draining the floodplain. The Owner subsequently was notified by the Corps of Engineers that the resulting clearing and earthwork disturbance occurred without obtaining required Section 401 and 404 permits. The US Environmental Protection Agency (EPA) and Department of Justice (DOJ) consequently became involved as part of an enforcement action. Settlement negotiations resulted in this Restoration Report, which will include restoring the floodplain ecosystem back to a state resembling the more recent pre-disturbance conditions with features consistent with other floodplain habitats in the area. In addition, the Owner agreed to further increase floodplain connectivity compared with pre-disturbance conditions by also excavating a second notch to form a high flow channel through the old (Witte) levee at a location near the upstream end of the project site. This action could represent an enhancement over pre-disturbance conditions.

This technical memorandum summarizes the technical basis behind the restoration design to support permitting and Clean Water Act-related review. This memorandum:

- Summarizes the steps leading to the development of the selected alternative.
- Documents the technical decisions that informed project design development.
- Provides a determination of quantities and construction cost based on the design.
- Describes a monitoring plan.

The work and resulting design described in this memorandum were performed and developed in collaboration with DOJ technical representatives, and relates to assessing the characteristic hydrology, hydraulics, geomorphology, and vegetation community associated with the project site, and using the results to guide the design of floodplain grading and revegetation measures. Technical information reported by Tim Lindsey in various communications to DOJ/EPA (August, December 2019; September, November 2020) was also utilized in design considerations.

To assist with the assessment and design, a topographic and water surface elevation survey was performed for the Owner by a licensed Professional Land Surveyor (PLS), in conjunction with field data collection performed by R2 in October 2018.

2 SITE PHYSICAL CONDITIONS

The project site is located along the Yaak River, in Section 2, Township 35N Range 33W, and is located between Pheasant and Whitetail creeks (Figure 1). The Yaak River's headwaters lie in the Kootenai National Forest. Regional bedrock is comprised of various members of the Precambrian Belt Supergroup; glacial-alluvial material is present throughout much of the valley with Holocene-to-Recent valley-fill defined by fine-grained floodplain deposits and soils. A bore log for an onsite water well (see Figure 2) indicates gravel and sand extends more than 40 ft below the floodplain surface. Within the vicinity of the project reach, land use consists of primarily rural living and recreational properties.

2.1 Channel and Floodplain Geomorphology

The project reach is a very low gradient channel (S~0.000013 at low flow) with floodplains on one or both sides. The bed material is predominantly fine sediment. Bedload through the reach consists of sand; the gradient is too low to transport gravel, which exists as relic features trapped at upstream and downstream hydraulic controls. Water levels and floodplain inundation in the reach are controlled hydraulically downstream within a narrow bedrock-confined section, located upstream of a bridge crossing the river (Figures 1, 4). Other bedrock ridges dip into the valley at various locations, including adjacent to the upstream edge of the project site, where the former bridge was situated. The river channel is deep along the project site, and extremely so at two right angled bends where the channel meets the valley edge and depths are in excess of 25 feet at low flow (Figures 2, 4). The channel planform appears to be stable, with little evidence of historic channel migration. Relic channels are not evident over the opposing bank floodplain as discernable in a cross-section survey performed for this project. The floodplain strata through which the river flows appears to be composed of very fine material, and the banks are well vegetated. Hence, instead of lateral erosion, the channel in the vicinity of the project floodplain appears to have adjusted to flood flows vertically.

Floodplain soils on the project site were characterized for the DOJ by Dr. Scott Stewart. Based on the presence of tephra material encountered during excavation of the affected floodplain, the reported existence of artesian flow from the adjacent hillslopes, and surveyed water surface elevations in the pond being approximately 3 ft higher than the river in October 2018, it is apparent that pond excavation intercepted groundwater springs. Periodic monitoring of the static water levels (SWL) of the onsite water well and adjacent pond surface elevations during 2020 suggests the ponds could overflow during periods of higher groundwater levels; however, the presence of an animal burrow through the upper Pond 2 berm into the lower Pond 3 served to keep pond surface levels lower than the well SWL. The Pond 3 surface level is controlled by

the river level at spring high flow, by the outlet notch to the river when river levels drop, and by groundwater levels as the water table drops below the elevation of the outlet notch in late summer. The difference in pond elevations at the time of the October 2018 survey indicates that the flow of groundwater is away from the northeastern-bounding hillside, in the western direction, where water levels were highest in pond 1 and lowest in pond 3 (see Figure 2).

During river high water, the predominant mechanism for floodplain inundation on the project site appears to have been flow through the existing notch. Overbank flow from the river upstream of the backwater channel is generally restricted by the historic Witte levee to infrequent, extreme flood events. A similar floodplain inundation process appears to exist on the left bank as well. A cross-section covering the opposite bank floodplain (Figure 5) shows the remains of the historical levee constructed there and visible in Figure 3.

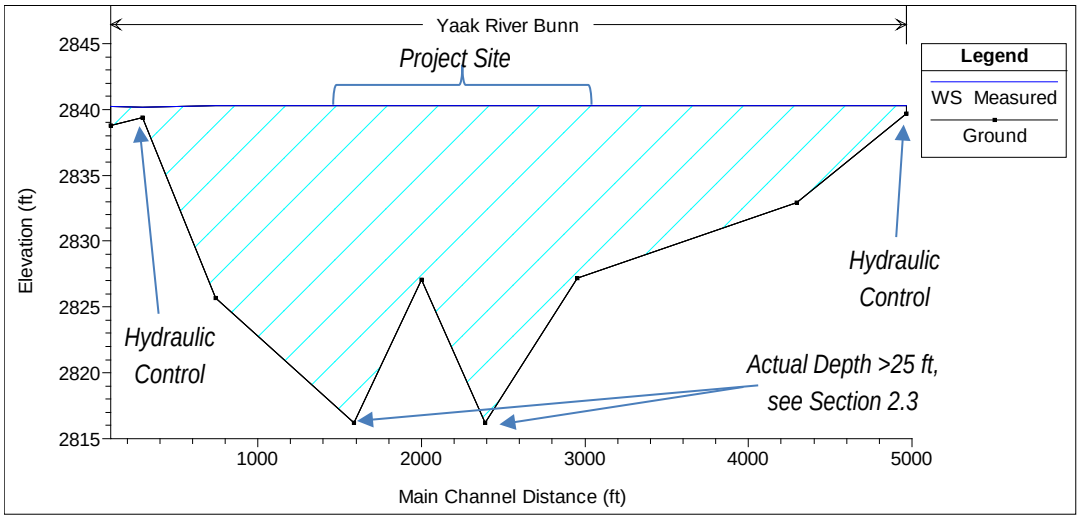

Figure 4. Surveyed long and water surface profile of the Yaak River within the vicinity of the project site. Flow is from right to left; the value depicted, 57 cfs, was measured on October 1, 2018.

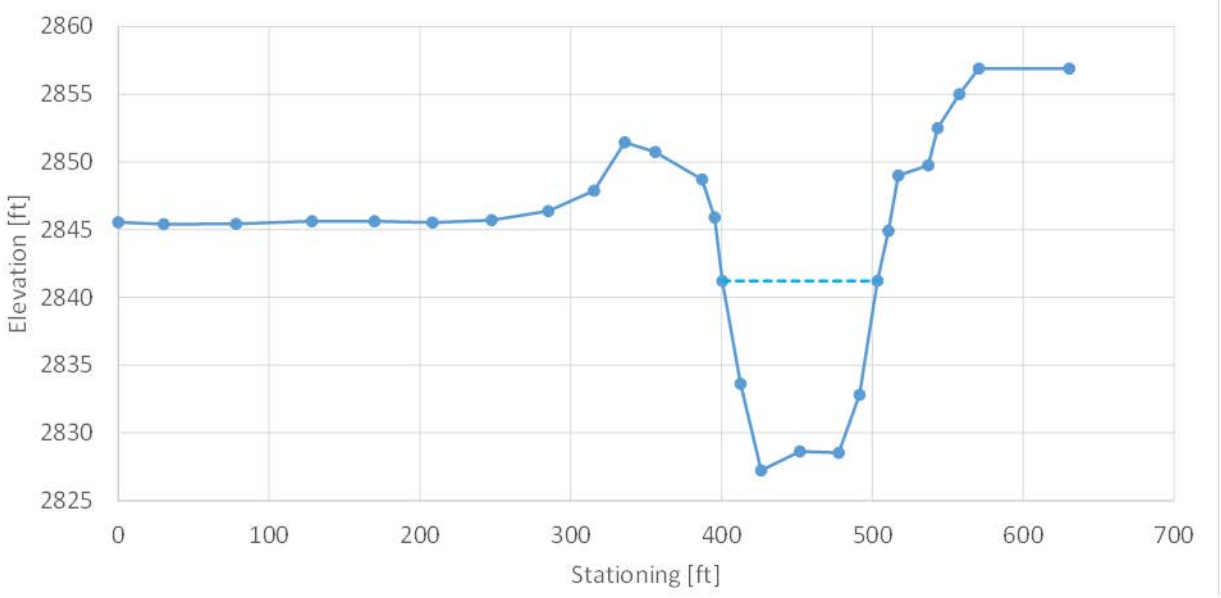

Figure 5. Surveyed cross-section profile of the Yaak River within the vicinity of the project site, including across the left bank floodplain). Pond 1 is to the right of profile; a high flow inlet cut is proposed for the right bank at approximately elevation 2845' (see Section 3.2). Water surface elevation shown as dashed line for measured low flow = 57 cfs.

2.2 Hydrology

The USGS Geological Survey (USGS) has maintained a long term streamflow gage near the mouth of the Yaak River near Troy (Station #12304500). A second gage was also maintained for a short period near the Whitetail campground located just upstream of the project site (Station #12304200; period of record WY 1956-62). Peak flows at the upstream gage generally scaled closely with flows at the lower gage for the same event (Figure 6). As a second check, the USGS' StreamStats regional regression website (USGS 2018) was used to estimate flood peak flow rates for various recurrence intervals at both locations, and use the ratio of gage- to regression-based flow estimates to adjust the regression estimates at the site. The numbers were similar in magnitude, with greater correspondence for the more frequent flood events that will be of greatest relevance to the restoration design (Table 1), indicating that the relation depicted in Figure 6 is a reasonable approach to estimating the more frequently occurring high flows at the site.

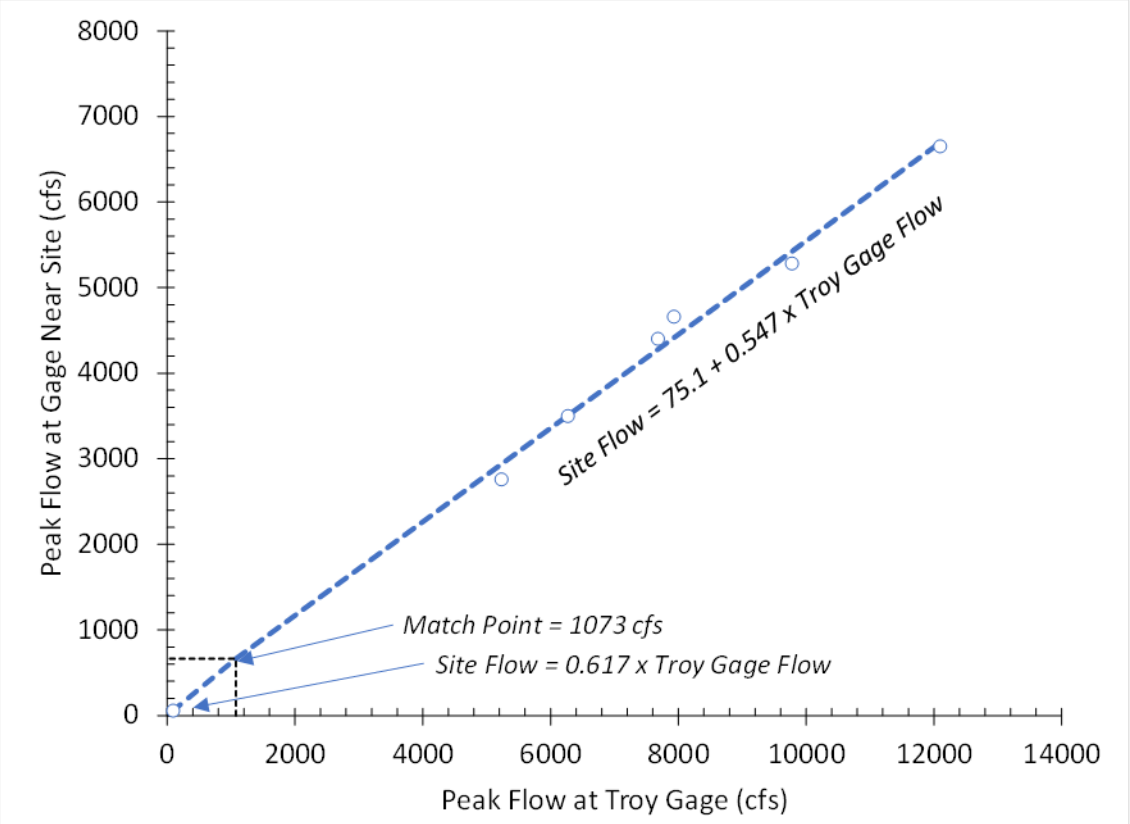

Figure 6. Comparison of peak flow rates measured at the two USGS gages on the Yaak River, WY 1956-1962. Resulting regression line was combined with a low flow measurement to define a rating curve relating flow at the gage to flow at the site.

Table 1. Approximate flood magnitudes estimated for various recurrence intervals in the Yaak River at the Troy Gage and at the project site.

	Flow (cfs)		
Recurrence Interval (years)	Troy Gage (Station 12304500)	At Site Using Figure 6	At Site Gage:Regression Ratio
1.5	5,620	3,150	3,360
2	6,490	3,620	3,960
5	8,610	4,790	5,460
10	10,000	5,550	6,470
25	11,700	6,500	7,740
50	13,000	7,200	8,690
100	14,300	7,910	9,650

To create a full-range rating curve for the site, the flow measured on-site on October 1, 2018 was compared with the flow at the gage, and the ratio of the two was assumed to represent the lower end of the flow range. The flow at which this ratio is equivalent to the high flow regression curve is at around 1073 cfs. The resulting combined rating curve that can be used to convert flow at the Troy gage to flow at the site is depicted in Figure 6.

Using the rating curve, a flow duration curve was developed for the site (Figure 7). This was then modeled using a hydraulic model to predict frequency of inundation for different elevations on the project site (see next section).

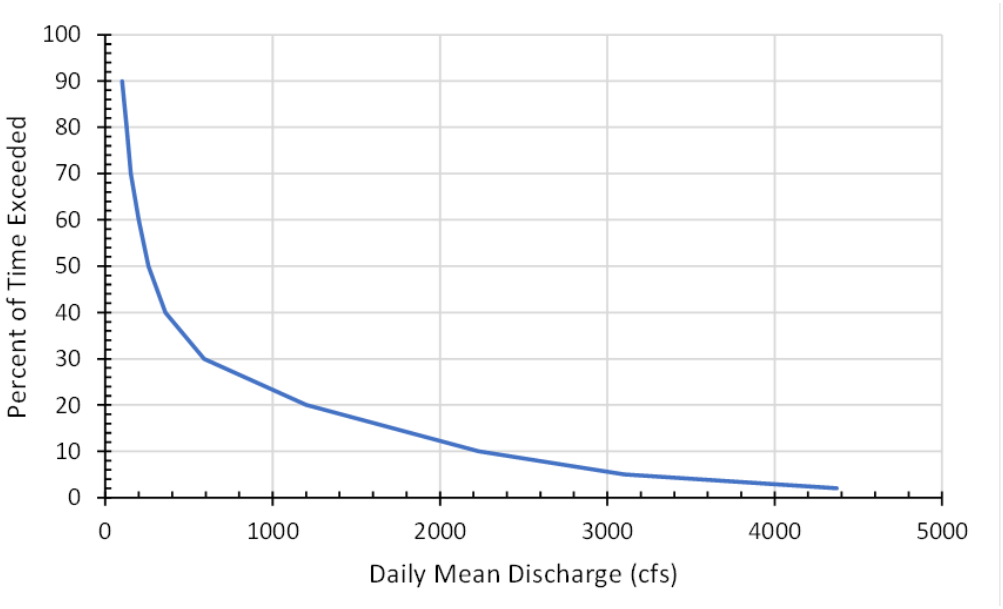

Figure 7. Annual flow duration curve for the project site.

2.3 Hydraulics

A simple HEC-RAS hydraulic model was created to simulate water levels over a range of river flows bracketing bankfull stage and below. The intent of the model was to identify water levels for floods with various recurrence intervals that influence the selection of which wetland species to specify, and which elevation bands they should be planted in. The model was developed using a combination of survey and depth sounding data. Streambanks and water's edge/water surface elevation were surveyed by a licensed PLS using high resolution Real Time Kinetic (RTK) GPS equipment.

Cross-section profiles were established at eight locations, including at upstream and downstream hydraulic controls, and at locations that captured major changes in channel depth and width in between (Figure 8). The hydraulic control profiles were surveyed to high resolution across the channel. Because of the extremely low gradient in the reach and the

strong influence of the downstream control on water levels upstream, it was considered sufficient to survey the cross-section bathymetric profiles of intervening cross-sections more cost-effectively by using an inflatable kayak and sounding with a 25 ft long stadia rod at five locations across the channel, at a fixed distance from each bank, and at ¼-, ½-, and ¾-wetted channel width locations. Bed elevation was calculated from the depth and water surface elevation measurements. The thalweg depth exceeded 25 ft at the two bend scour-hole cross-sections, so the model invert elevation was set initially to correspond to 25 ft depth. This was done as a matter of convenience, where making the thalweg elevation lower has no discernable effect on predicted water levels in the reach because of the hydraulic control downstream.

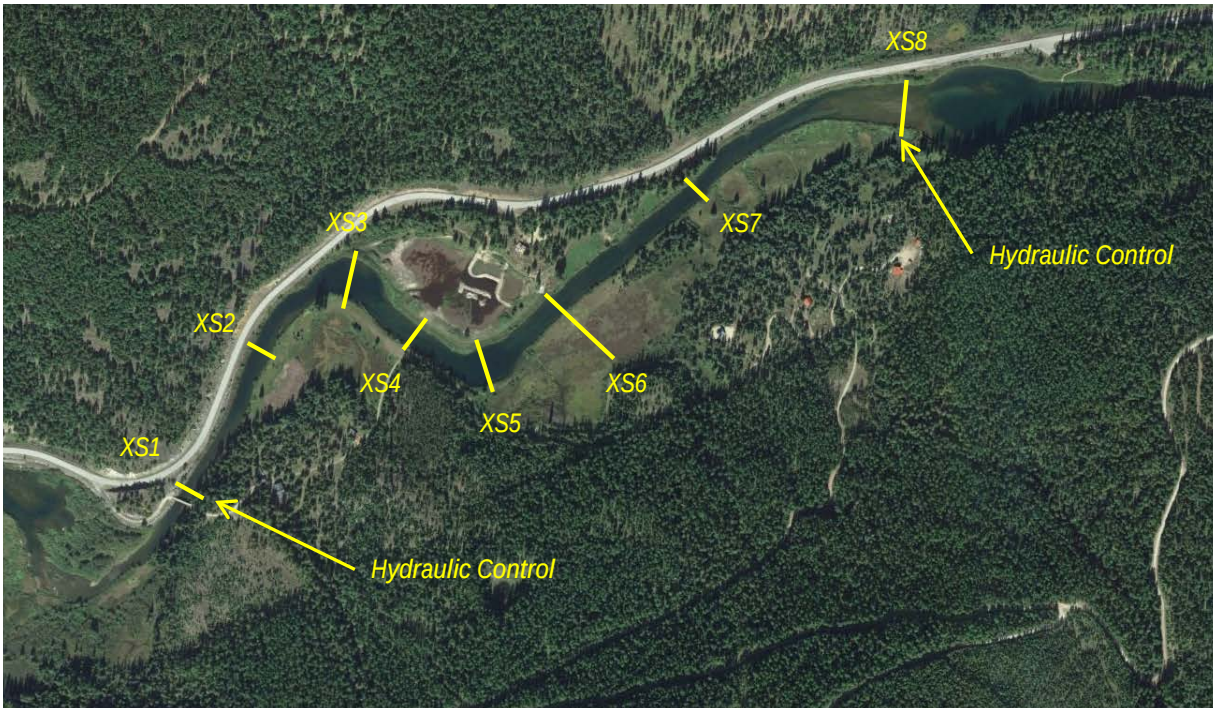

Figure 8. Locations of surveyed HEC-RAS model cross-sections. Figure 5 depicts the profile for XS6.

Two additional cross-sections were added below the lower hydraulic control, one below the bridge near the downstream exit of the confined section, and one downstream to emulate the greater floodplain storage capacity there and its effect on water levels upstream during overbank floods. The floodplain elevation of the lower added cross-section was estimated from USGS' 7.5 minute topographic map to be approximately 2841' (NAVD88 datum; converted from NGVD29 datum). Floodplain elevation for the other cross-sections was estimated from the top of bank survey data.

The model roughness coefficients were initially calibrated to the flow measured at the time of surveying, which was approximately 57 cfs. The resulting Manning's n= 0.022 within the

confined section appeared reasonable for this site (cf. Chow 1959). The value of *n* did not affect results upstream because of the strong hydraulic control effect in the confined section.

The model was then calibrated to peak flows that occurred in 2017 through 2018, using the rating curve depicted in Figure 6 to covert peak flow rate at the gage to that at the site. Based on an anecdotal account and accompanying photographs provided by the Owner as to peak stage observed during each event relative to surveyed berm crest elevations, the downstream control energy gradient (S_f) was varied to minimize the prediction error. This occurred for a value of S_f = 0.000041, which resulted in predicting peak water levels in 2017 and 2018 that were respectively 0.04 ft lower and 0.04 ft higher than remembered, and were generally consistent with photographs of water levels taken at other times during the events. In addition, the results were consistent with general hydraulic engineering theory, where the water level within the confined section was lower than upstream and downstream, reflecting subcritical flow contraction there (Figure 9). The hydraulic model was therefore considered reasonably accurate for use in design of an inlet channel at the upstream end of the floodplain, and for defining revegetation elevation zones at regraded areas based on frequency of inundation.

Selected monthly flow statistics were then run through the model to predict corresponding river water levels at the site (Figure 10). This information was used to specify plant species suitable for different elevations on the property after regrading is completed.

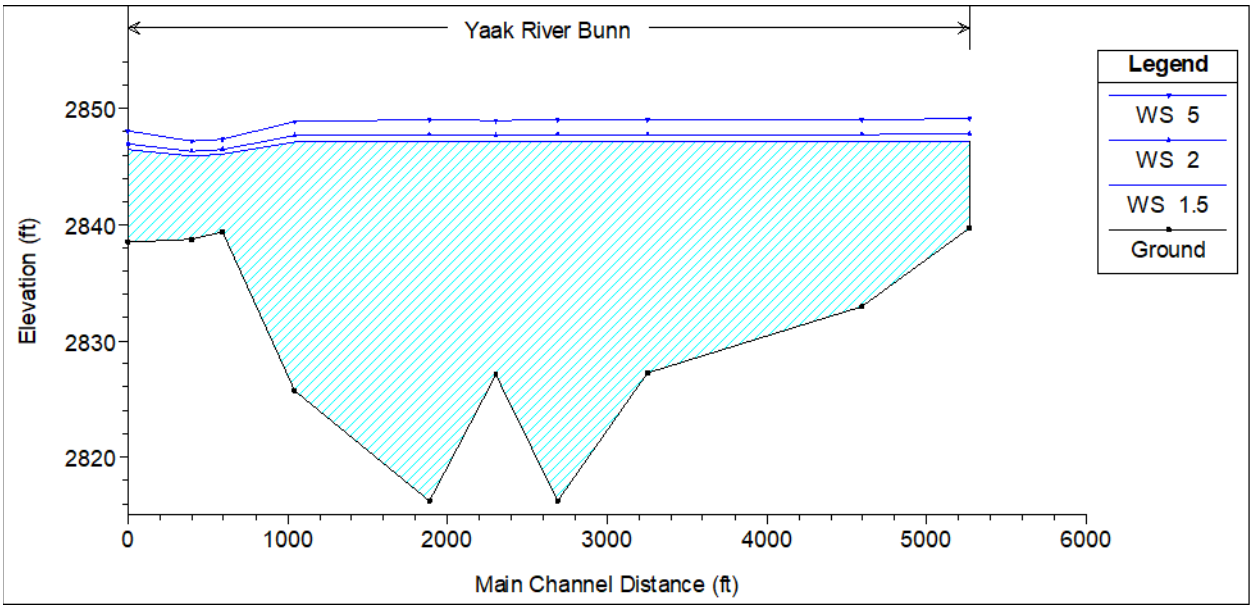

Figure 9. Predicted long profile of water levels within the project reach at peak flow during the 1.5-, 2-, and 5-year return period flood events. Flow is from right to left. The outlet connecting the floodplain to the river is located near station 2,300 ft.

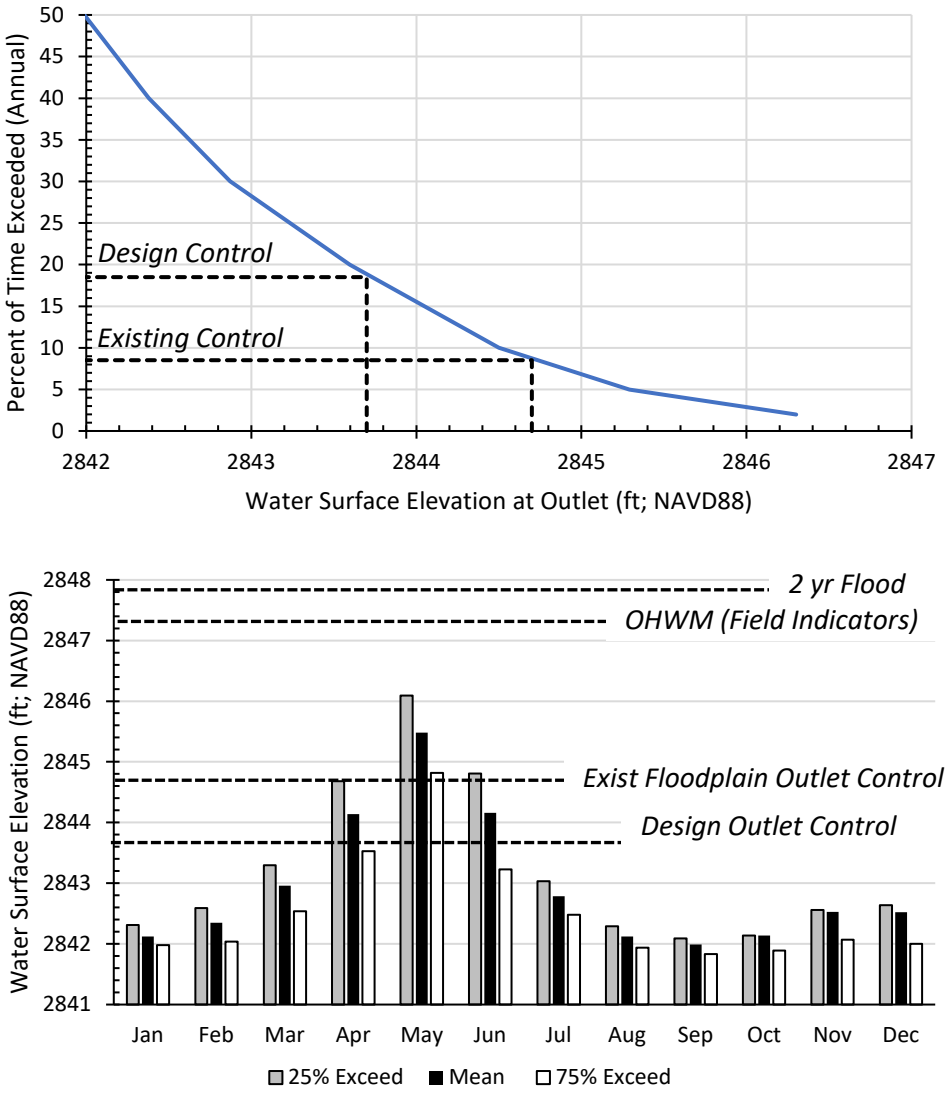

Figure 10. Predicted annual (top) and monthly (bottom) duration characteristics for water level at the outlet connecting the property floodplain to the river. The dashed lines depict elevations relevant to specifying plant species across the Bunn property floodplain; note the proposed inlet channel invert elevation is 2845'. The values 25% and 75% in the bottom graph refer to the percent of days in each month over the period of record that the river water level is higher than the corresponding value on the vertical axis.

3 DESIGN DEVELOPMENT

The development of the floodplain restoration design reflects the following key elements:

1. The historical Witte outlet notch will be lowered by approximately 1 ft over a short length as soon after the spring thaw as possible. Sustained ponding caused presently by the outlet control will be reduced in duration, allowing earlier initiation of restoration construction activities.

2. The main berms formed to separate the three ponds during excavation shall be scalped down to near the original native ground floodplain elevation (which was approximately 2845' in the vicinity of the ponds). Similarly, the island berms built south of Pond 3 will be scalped to elevation 2844.0', to be in line with the convergent floodplain topography/drainage overall. The tephra material present in berm shall not be used as topsoil material, but will be placed in current open-water areas (primarily Pond 3) and covered.

3. Pond 3 and a depression area to its south will be refilled; Pond 1 will be partially refilled and connected with pond 2 to create a modified floodplain open water channel feature similar in scale and morphology to others that exist at several locations throughout the valley (cf. report prepared by Tim Lindsey for DOJ describing such features).

4. The spoils piles distributed along the riverside edge of the floodplain shall be scalped and the salvaged materials used as fill onsite to form microtopographic mounds and contribute to pond fill as needed; reed canarygrass covering the spoils piles shall be disposed of into deeper water areas (primarily pond 1) and covered in a manner to limit its ability to grow back.

5. A new river inlet channel shall be excavated at the upstream end of the floodplain that is engaged at high flow, thereby increasing floodplain connectivity over pre-floodplain modification (i.e., historic) conditions.

6. Fill material will be placed over modified areas of the floodplain to form microtopographic variation, with large wood pieces added, to increase morphologic and vegetation community complexity. To the extent practicable, earthwork disturbance will be avoided over areas of the floodplain where native wetland vegetation has naturally recolonized.

7. The areas of the floodplain and the inlet cut shall be revegetated with native wetland and riparian plant species that are compatible with the prevailing inundation hydroregime. Areas with re-established native vegetation will be preserved and augmented with select new plantings for greater community diversity.

These seven elements of the design are addressed more specifically below.

A topographic surface was generated in CAD by the surveyor for the dry areas of the floodplain with data collected in early October 2018 using survey grade RTK GPS equipment. The surface was provided to R2, and a bathymetric surface was subsequently added to the pond areas in CAD using depth measurements collected by R2 using an inflatable kayak at the same time. One foot contour elevations were generated for a CAD base map (see proposed plans in Appendix A), and for use in various earthwork volume and area calculations.

The georeferenced RTK GPS survey data were also compared against local datum survey data collected on June 17, 2019 by LC Lee & Associates (LCLA) to characterize elevations relevant to developing a planting plan. LCLA surveyed relative differences between various ground shots and river water surface elevations on that date, so the flow at the Troy gage on that and the following day was used as the basis for estimating the water surface elevation of the river (≈2843.5', compare with ≈2841.2' during the October 2018 survey), using the HEC-RAS model and the relation in Figure 6. Based on the relative elevation differences, the following key elevations (NAVD88 datum) were established and corroborated against the RTK GPS data (cf. Figure 10):

- Floodplain Inflow-Outflow Control Elevation (Existing) ≈2844.7'
- Upper Elevation of Wetland Vegetation Patch Visible in Historic Aerial Photography (cf. Figure 2) ≈2845' (≈Elevation of Opposite Bank Floodplain)
- Ordinary High Water Mark (OHWM) Elevation ≈2847.3'
- 2-year Flood Elevation ≈2847.8'

3.1 Lowering Outlet Notch Control Elevation

The outlet of the floodplain will be locally contoured to drain at elevation 2843.7', 1 ft lower than the existing control elevation. This will set up hydrogeomorphic conditions that emulate what existed previously before the approximately upper 1 ft of floodplain was scalped and hauled offsite. The net effect will be analogous drained conditions in late spring, summer, and winter as occurred prior to 2013 (see bar graph in Figure 10). Consequently, a comparable vegetation community is expected to become established over time that resembles what was there previously. As part of adaptive management, subsequent monitoring of soil conditions and vegetation community composition will inform future outlet elevation considerations. Total volume of excavation is expected to be 7 cubic yards (CY) or less.

3.2 Pond Berm Scalping

The main berms intersecting the three ponds will be scalped down to elevation 2845.0', consistent with the native ground floodplain elevation evidenced by a zone of recovered vegetation at the base of the pond 1 and 2 berms. The island berms distributed around the south side of Pond 3 will be scalped down to elevation 2844.0'. As noted in Section 3.3, Pond 3 will be filled to grade between these two elevations, and a shallow water saddle connection will be formed between the partially filled Ponds 1 and 2 to create a modified floodplain open water feature. Tephra material recovered from the berms will be disposed of primarily in pond 3, and remaining tephra-free material will be used to cover tephra and reed canary grass spoils in Ponds 1 and 3, or to form microtopographic mounds locally. The estimated total volume of material contained in the berms that will be excavated is equal to 1729 CY.

3.3 Pond 3 Fill and Creation of Open Water Feature Modifying Ponds 1 and 2

Pond 3 will be filled to elevation 2844' with a gently sloping grade approaching the edge of the scalped main berm; estimated total volume required =1706 CY. The depression area south of Ponds 1 and 3 will be filled to approximately elevation 2843.5', to eliminate ponding. A shallow water connection saddle will be formed between Ponds 1 and 2 to create a floodplain open-water feature analogous to others found in the valley. The open-water feature side slopes will be planted with suitable wetland vegetation (see Section 3.7). The open water area during low flow periods will thus be reduced accordingly.

A strategy is proposed of using the current ponds 1 and 3 as disposal sites for material unsuitable as a planting medium for wetlands vegetation, including concentrated tephra spoils and the surface layer from the spoils piles containing reed canarygrass roots, stems, and rhizomes. Reed canary grass rhizome material will be disposed of primarily in Pond 1 using up to approximately 310 CY of material. Pumping the water level down will enable placement and appropriate compaction and covering of these fill materials. The unsuitable material will then be covered with any remaining material from the berm scalping not used elsewhere. Within the open water feature, a top armor layer may be placed over the deepest areas. The armor layer would be composed of a gravel-soil mix borrowed from the adjacent upland hillslope. The resulting open water feature will then be allowed to refill naturally from groundwater inflows originating from the adjacent hillslope.

3.4 Spoils Pile Material Redistribution

Previously excavated material is stored onsite in five main spoils piles. The spoils piles will be a primary source of material for redistribution across the floodplain restoration site. Each pile will first be mowed closely to ground level, and the waste composted either onsite in an upland

area, or off-site at an approved location. The upper 1 ft of cover material can be assumed to be unsuitable for use as top-fill because of reed canary grass roots and rhizomes that could regenerate (WRCGMWG 2009). This layer would instead be stripped and disposed of in pond 1, and be perennially submerged to prevent regrowth. The remaining soil material will be used to fill and grade microtopographic areas of the floodplain, except for any concentrated clumps or strata of tephra material, which would also be disposed of in ponds 1 and 3. Activities will be implemented to avoid and minimize adverse impacts to the maximum extent practicable. Material stored in the spoils piles has an estimated total volume above the surrounding floodplain surface equal to 2440 CY. Of this, the upper 1 ft of cover material with reed canary grass roots and rhizomes has an estimated volume = 310 CY.

3.5 New River Inlet Channel Excavation

A second, new inlet channel is proposed for excavation between the river and the open water feature, cut through the historic Witte levee fill material placed in the early 1900s. This channel will increase the hydraulic connectivity of the floodplain compared with pre-disturbance conditions. The elevation of the inlet channel invert is proposed to be 2845', higher than the proposed outlet control elevation (≈2843.7'). The channel will have a bottom width equal to about 3 ft, and 2H:1V side wall slopes over most of its length, except for a roughly 8 ft wide portion along the existing levee where a gentler sloped ford for 4WD vehicles will be excavated (currently proposed and drawn up for an 8H:1V approach slope; final slope for vehicle access will be determined in field in consultation with Mr. Bunn). The total volume excavated will be approximately 314 CY; this material will be distributed onsite in a similar manner as the spoils pile and scalped berm material. The channel does not need any special erosion protection, as the water level there and at the backwater channel downstream will be approximately the same given the extremely low gradient in the reach (S~0.001-0.005%). Velocities are accordingly expected to be <<1 ft/s through the inlet. However, the ford surface will need rock armoring locally to prevent rutting and erosion by vehicles.

3.6 Floodplain Grading

Fill material sourced from the spoils piles will be placed on the floodplain in microtopographic mounds, to create a hummocky meadow profile similar to other areas in the valley. The grading of mounds will rise to around elevations 2844'-2845' and mounds will be distributed irregularly across the floodplain to achieve a diversity of site water balance gradients across the restoration site. This diversity would translate to a more complex plant community diversity, with species distribution reflecting the actual site water balance gradients that result. The mounds will be irregular in size and shape and placement, with a direct path left open across the center of the floodplain to drain overland flow from the proposed open water feature

towards the notch. The mounds will be distributed to minimize disturbance of areas that have been recolonized by pioneer native wetland vegetation, especially along the western area of the floodplain. Material will come from the spoils piles and the inlet and outlet cuts, and is estimated to have a net volume (after filling pond 3 environs) equal to approximately 2310 CY.

Increasing the microtopographic complexity by also creating small depressions could present an increased trapping and stranding risk for fish and is thus not proposed.

3.7 Vegetation Restoration Design

The vegetation restoration plan is intended to restore areas of the floodplain community that were excavated using plant species observed in the field locally onsite and at other nearby Yaak River reference sites. Which species should be planted where will depend on the frequency and duration of inundation, which will be controlled by backwatering from the outlet and inflow from the created high flow river inlet when the river water surface elevation is higher than the respective controlling elevations, and seasonal groundwater levels. For the most part, the areas disturbed are at elevations with inundation frequencies and durations that appear to support primarily obligate and facultative wetland category species following the National wetland plant list indicator rating system (Lichvar et al. 2012).

The proposed revegetation plan is based on observations made by LC Lee & Associates in June of 2018 of native plant distributions at sites that range from perennially wet conditions (i.e., those areas of the floodplain lying below the outlet control elevation) to fringing, relatively dry conditions that are rarely inundated. The plant species along the gradient will reflect what local riverine wetlands support typically, where the actual prescribed species distributions will reflect the design final topographic and hydraulic grades as they influence expected development of onsite water balance gradients and groundwater/surface water levels, along with potentially other factors such as soil textures/structures, heat load, and nutrient availability. Re-established native species recovering onsite will be utilized as appropriate.

Table 2 summarizes general plant species proposed for revegetation that may be available at regional native plant nurseries, including Montana Conservation Seedling Nursery in Missoula (*www.dnrc.mt.gov/nursery*), Great Bear Native Plants in Hamilton (*www.greatbearnativeplants.com*), and Glacier Nursery near Kalispell (*www.glaciernursery.com*). It may be necessary to substitute some plants based on availability, following recommendations of nursery staff, or propagated from local cuttings. In particular, Douglas Spiraea and Mountain Alder may be difficult to obtain commercially in sufficient quantities or at all, respectively. To the extent possible, onsite sources will be used for plantings. For example, there are dense growths of

Douglas Spiraea and willows along the north-west border of the floodplain from which cuttings can be readily propagated (T. Lindsey, personal communication).

Table 2. Proposed planting specifications for restoring a native wetlands plant community over the project site.

Plant Type	Common Name	Genus and Species	Wetland Indicator Rating[1]	Planting Specifications		
				Elevations/ Where	Method	Spacing (on center)
Forb	Beaked Sedge	*Carex utriculata*	OBL	<2844.1' Flat or Gently Sloped Areas	Plugs/Bare Root, Container	3'
	Creeping Spikerush	*Eleocharis palustris*	OBL	<2844.1' Flat or Gently Sloped Areas	Plugs/Bare Root, Container	3'
	Swordleaf/Three Stamened Rush	*Juncus ensifolius* var. *montanus*	FACW	2844.1'-2845.5' Ponds, Inlet, Fringe	Plugs/Bare Root, Container	3'
Shrub	Red-Osier Dogwood	*Cornus sericea*	FACW	2845.5'-2847' Inlet, Fringe	Cuttings, Bare Root, Container	4'
	Sandbar Willow	*Salix exigua*	FACW	2845.5'-2847' Inlet, Fringe	Cuttings, Bare Root, Container	4'
	Douglas Spiraea	*Spiraea douglasii*	FACW	2844.1'-2847' Mounds, Fringe	Cuttings, Container	3.5', 12'
Tree	Mountain/ Speckled Alder	*Alnus incana* ssp. *Tenuifolia*	FACW	2846'-2847' Inlet, Fringe	Container	12'

[1] – OBL = Obligate Wetlands, FACW = Facultative Wetlands

In general, a mix of obligate wetland forb species will be planted over the floodplain where elevations are around 2844' and lower. A mix of facultative wetlands shrub and forb species will be planted between that elevation and the approximate ordinary high water elevation (~2847'). This will include along the periphery of the excavated area, along the edges of the open water feature, and on top of the microtopography mounds that will be distributed across the restored floodplain. In addition to cuttings, plugs, and container planting, much of this area may be seeded with a blend of native reclamation grasses to provide beneficial cover. Using a mix of species (as opposed to a monoculture) within each elevation band supports establishing plant community diversity and reduces the potential for widespread failure should one species

have a harder time becoming established. Significant natural wetland vegetation recovery has occurred across substantial areas of the floodplain meadow, particularly in the western portion, and new plantings will be distributed among existing plants.

Elevations above 2847' were generally not excavated during the original disturbance, and thus will require mostly seeding with native upland grass seed mix in any areas disturbed by heavy equipment during the site restoration work. Seeding may be conducted before, during, and after the restoration earth-work activities.

Prior to planting, the fill material should be worked and handled to the minimum extent possible to avoid excessive compaction by heavy equipment. At the same time, the placed material will need to be consolidated sufficiently to avoid excessive 'lofting' of the soil and provide a suitable planting medium. In addition, a total of twelve (12) conifer logs with and without rootwads will be placed around the site to mimic accumulations seen at other open water features in the valley (see Appendix B). The logs were seen to be distributed within the open water area and around the periphery of the floodplain at each location. Accordingly, the logs will be distributed in a similar manner during construction. The logs will be placed loose, similar to the natural analog to provide enhancements to the floodplain ecosystem.

4 COST ESTIMATE

The 100 percent design scoping level cost estimate is presented in Table 3.

Table 3. Engineer's Opinion of Probable Cost.

	Mobilization, Site Preparation, Temporary Erosion and Sediment Control (TESC)	$5,960
	Earthwork	$34,120
	Dewatering	$560
	Revegetation (commercial sources)	$63,030
	Logs	$2,400
	Site Restoration, Demobilization	$3,150
	Total Direct Costs	**$109,220**
1.0%	Bond and Insurance	$1,092
	Total Contractor Cost	**$110,312**
10.0%	Contingency	$11,031
	Total Owner Cost	**$121,343**

The earthwork costs assume a unit cost of $8/CY excavated and placed onsite, which is within the higher range of topsoil salvage and placement costs in Montana Department of Transportation's database.

The revegetation cost estimate is based on a worst-case situation where all of the affected floodplain area is disturbed to bare soil by heavy equipment during the restoration work. Areas with intact recovered native forb vegetation will be left as-is, with plantings of shrubs and forbs interspersed as directed work at an overall reduced density. In addition, the cost estimate is based on needing to purchase Spiraea container plantings from commercial nurseries, if propagated cuttings and clumpings cannot be locally sourced. Utilizing currently recovering native vegetation assemblages already adapted to the site may significantly impact the base-case cost estimates. Selection of recommended reclamation seed blends may also be an alternative to help create healthy forage habitat, soil chemistry and structure.

5 MONITORING PLAN

Monitoring shall be performed midway through (July) and near the end (September) of the first growing season, then annually in late summer for at least five years. However, the Owner may seek release of further monitoring if the restoration project has achieved the success criteria in less than five years as shown by the submittal of two consecutive annual monitoring reports that demonstrate that success criteria have been met, including verification through an EPA or Corps inspection. Details on proposed project monitoring targets, standards, measurement methods, success criteria and recommended contingency measures are presented in Appendix C. A simple statistical approach will be followed, whereby three (3) replicate monitoring plots covering approximately 1/100 acre (~435 ft^2) will be established randomly within each of the three planting zones. An average value of each success criterion metric will be calculated and compared against the appropriate criterion. Methods, data, photographs, and findings will be submitted in an annual report, which will include interpretation of results and proposed corrective or contingency measures as needed. Best efforts and adaptive management principles are expected to lead to successful restoration/recovery.

6 PROPOSED CONSTRUCTION SCHEDULE

Table 4 and Figure 11 depict the proposed schedule regarding project sequencing. Lowering the outlet elevation will allow for earlier start of restoration construction activities; earthwork likely to begin by mid-to-late July, with majority occurring in August. Ground saturation will be a key constraint and depends on surface water and groundwater levels. It is possible based on previous years that water levels will still be around elevation 2844' in mid-June.

Table 4. General restoration project activities schedule for 2021.

ADMINISTRATIVE/WEED MNGMT	EARTHWORK ROUGH-IN	EARTHWORK FINAL GRADE	PLANTING AND SEEDING
Early March - early June	*Early July – Mid-August*	*Mid- to late August*	*Mid-August - early October*
- Final restoration report - Collaborate with State/County/Federal agencies - Final consent decree - Public notice - Final settlement/Approval - Weed burning and initial herbicide treatment - Modify outlet elevation - Monitor river, meadow, groundwater elevations	- Install silt fences and other BMPs - Remove pond berms - Remove and grade soil stockpiles - Plug/fill/grade Pond 3 - Scalp Island berms - Fill adjacent areas - Partial fill Pond 1 - Complete open water feature - Cut upstream river inlet	- Final grade contouring across site - Create micro-topography - Top-dressing soil and veg matter - Place large woody materials - Prep soil for planting/seeding - Selective seeding during earthwork	- Plant border willows/shrubs - Plant sedges, rushes, etc. - Broadcast other native seeds NOTE: ALL ACTIVITIES MARCH THROUGH OCTOBER ARE HIGHLY CONTINGENT ON WEATHER, GROUND CONDITIONS, PLANTING STOCK, AND CONTRACTOR AVAILABILITY.

JULY 11, 2014

SEPTEMBER 13, 2014

SEPTEMBER 28, 2015

CATEGORY/TASK	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	COMMENTS
COMPLETE SETTLEMENT AGREEMENT/ RESTORATION PLAN			XX										
INFORM COUNTY/STATE OF REVISED DESIGN PLAN				XX									Presentations/site meetings/least impacting discussions
OBTAIN COLLABORATIVE AGENCIES' CONCURRENCE					X								Assume mid May multi-agency concurrence
MPDES or waiver & DNRC WATER RIGHT					X								will apply after verbal agreement to restoration plan
WEED MANAGEMENT													
MEETING W/LINCOLN COUNTY WEED MGMNT			X										Plan to meet in field with Weed Dept Mgr
CONCURRENCE WITH PROPOSED BURNING/HERBICIDES			X										LC Weed Dept and County Health Dept approval
CONTACT POTENTIAL CONTRACTORS			X										Initiate discussions with Moose River contractor
CONFIRM BURN ACTIVITIES (WEATHER DEPENDENT); INITIATE BURN				X									Burn activities weather dependent
INITIAL EPA-APPROVED HERBICDE APPLICATION				X		X							Herbicide applications dependent on weather and high water
OPTIONAL ADDITIONAL HERBICIDE APPLICATION ALONG ACCESS ROAD AND UPLANDS								X	X				Spot applications as deemed necessary
MECHANICALLY TREAT SELECT REED CANARY MOUNDS							X						
ONGOING MONITORING AND FUTURE TREATMENT AS NECESSARY													Future herbicide applications as appropriate
MONITOR PRECIP/SNOWMELT WATER ELEVATIONS	X	X	X	X	X	X XX	XX	X	X	X	X	X	Photos and field checks; incl well SWL
MONITOR RIVER FLOOD SEASON WATER ELEVATIONS				X	X	XXXX	XX						Photos and field checks & gage recordings
EARTHWORK													
CONSIDER LEDPA's; SELECT BEST OPTIONS					X	X							Investigate local ecological reference sites
INTERVIEW CONTRACTORS/SOLICIT BIDS					XX	X							Plan revisions based on equipment & availability
ESTABLISH AND IMPLEMENT BMP'S; PRESERVE AND PROTECT NATURALLY RECOVERING AREAS						X	X						On-site meetings and installation
MODIFY CURRENT WITTE OUTLET NOTCH ELEVATION; CUT APPROX. 1 FT DEEPER			X										Can be accomplished at same time as weed burning operation
SELECTIVE PUMPDOWN OF SURFACE WATERS							X						Dependent upon effectiveness and pond fill sequence
CUT/FILL TEPHRA BERMS ALONG PONDS 1. 2. 3							X						Place berm material into adjacent pond 3
BEGIN ON EAST END SCALPING POND 1/3 BERM DOWN TO NATIVE GROUND ELEVATION								X					As soon as equipment able to access
CREATE TRUCK CAUSEWAY FOR PLACEMENT OF REED CANARYGRASS SPOILS INTO POND 1								X					
UTILIZE BERM MATERIAL TO CREATE EASTERN ACCESS FOR "ISLAND" BERMS REMOVAL								X					Fill into saturated areas as conditions allow
EXCAVATION OF BURNED HERBICIDE-TREATED REED CANARYGRASS ZONE FROM STOCKPILES								XX					
BEGIN ON STOCKPILE 5 NEAREST POND 1; UTILIZE TRUCK OR LOADER TO TRANSPORT SPOILS								X					Reed canarygrass spoils will be placed as deep water fill in Pond 1
EXCAVATE AND TRANSPORT RC SPOILS FROM STOCKPILES 3 & 4 TO POND 1 FILL								XX					as above
EXCAVATE RC SPOILS ON STOCKPILE 2; TRANSPORT TO POND 1 OR ADJACENT OPEN WATER								XX					as above
UTILIZE FRONT-END LOADER TO TRANSPORT SMALL STOCKPILE 1 RC SPOILS								X					as above
COMPLETE POND 1 AND POND 2 BERM SCALPING MOVING TEPHRA CAPS INTO POND 3								X					Tephra material placed as fill into deeper water
UTILIZE SCALPED BERM SURFACE FOR TRANSPORT OF STOCKPILE SPOILS TO FILL POND 3								X					may be concurrent with pond 1 partial filling
EXCAVATE SHALLOW SILL BETWEEN PONDS 1 & 2 AND RE-GRADE								X					modified open water feature
COMPLETE CREATION OF SINGLE OPEN WATER FEATURE REPLACING FORMER PONDS 1 & 2								X					rough grade completed
REDUCE "ISLAND" BERMS TO VEGETATION LEVEL; CREATE MICROTOPOGRAPHY								X					eliminate islands as soon as accessible across new fill
EXCAVATE AND TRANSPORT INTERNAL MATERIAL FROM STOCKPILES 3 & 4								XX					Fill toward island area; create micro-mounds
UTILIZE FOR POND 3 FILL AND FILL IN WET AREAS ON RIVER-SIDE OF "ISLAND" BERMS								X					Floodplain fill and grading
TRANSPORT INTERNAL STOCKPILE 5 MATERIAL TO FILL POND 3 & FORMER "ISLAND" BERMS AREA								XX					Begin fill toward Pond 3 deep and wet meadow
UTILIZE SOME VOLUME OF MATERIAL TO CREATE MICROTOPOGRAPHIC MOUNDS								X					concurrent with fill operations
EXCAVATE & TRANSPORT STOCKPILE 2 MATERIAL WHERE NEEDED THROUGHOUT FLOODPLAIN								X					Minimize adverse impact to Witte berm & ditch
REGRADE SOME MATERIAL EASTWARD INTO ADJACENT MEADOW OPEN WATER								X					fill/grade
UTILIZE SOME VOLUME OF MATERIAL TO CREATE MICROTOPOGRAPHIC MOUNDS								X					microtopography
EXCAVATE AND TRANSPORT WESTERN PILE 1 MATERIAL TO CONSTRUCT MICROTOPOGRAPHY								X					Consider least disturbing options
SPECIAL CARE TAKEN TO PRESERVE & PROTECT RE-ESTABLISHED WETLAND VEGETATION													minimize equipment adverse impacts; including compaction

Figure 11. Detailed timeline schedule of activities.

CATEGORY/TASK	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	COMMENTS
CONSTRUCT NEW UPSTREAM RIVER INLET THRU HISTORICAL WITTE RIVER BERM (LEVY)									X				Establish new high flow connection between floodplain & river
SELECT BEST LOCATION AND CONSIDER LEDPA PRACTICES									X				Will be determined in field as actual conditions may vary
UTILIZE ALREADY-DISTURBED AREAS AS MUCH AS POSSIBLE									X				avoid or minimize additional adverse impacts
DISTRIBUTE CUT SOILS FROM NEW INLET AS COVER ON SELECT FLOODPLAIN FILL AREAS									X				use material as final grade
COMPLETE ROUGH GRADE FROM STOCKPILES FOR FINAL FILL & MICROTOPOGRAHIC MOUNDS									X				Grading least disturbing final area footpprint
OUTLET MAINTENANCE AND MINIMAL RE-GRADING									X				Minimal impact up to riparian zone; consider final outlet elevation
UTILIZE SURPLUS MATERIAL FOR LOCAL FINAL TOP-DRESSING SOIL									X				Final grade and planting prep
COMPLETE GROOMING OF MICROTOPOGRAPHIC FEATURES/FINAL GRADE									X				Create final topographic elements
TRACTOR RAKE SELECT AREAS FOR SEEDING									X				Preparation for final seeding in select areas
PLACE VARIETY OF LARGE WOOD MATERIALS									X				Place large wood materials across site
INTERIM UPDATE REPORT WITH PHOTOS										X			Combine in Annual Final Report
VEGETATION													
SELECT SEED & PLANT SOURCE/NURSURY/LOCAL				X	X								Utilize Report select native selections
CREATE PHOTOGRAPHIC CATALOG OF CURRENT CONDITIONS				X	X X	X X	X	X X					Capture early growing season conditions
SECURE PLANTING CREW							X	X					Contingent upon availability
PLANT SHRUBS /FOCUS ON WILLOW-LINED OPEN WATER CHANNEL FEATURE								X					Contingent on plant stock, crew, weather
INITIAL SEDGE, RUSH, & FORAGE SPECIES PLANTING IN SELECT AREAS								X	X X				Contingent on weather
INITIAL BROADCAST SEEDING (SELECT EARLY SEASON AREAS NOT DISTURBED BY PLAN)					X X	X X	X X	X X	X X				Contingent on contractor proposal
CONTINUOUS MONITORING OF GROW-IN PERIOD						X	X	X X	X X	X X			Ongoing photo catalog; Continues in 2022
END OF SEASON UPDATE REPORT WITH PHOTOS											X	X	Combined earthwork and vegetation report
REPLACEMENT OR FILL-IN PLANTING AND SEEDING AS NEEDED									X X	X			continued thru end of 2021 growing season
MONITORING OF HYDROLOGIC, BIOGEOCHEMICAL,													2021-22 site monitoring; photos; brief reports
VEGETATION, & FAUNAL HABITAT WILL CONTINUE													Also monitor snow water equivalent, weather,
WITH MINIMAL REMEDIAL MITIGATION EXPECTED													precipitation. Monitor ground-water levels;
TO REACH ACCEPTABLE RECOVERY;													Monitor river flow and surface elevations
ASSUME 2 GROWING SEASONS													

Figure 11. Detailed timeline schedule of activities (continued).

7 REFERENCES

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APPENDIX A

100% Design Drawings

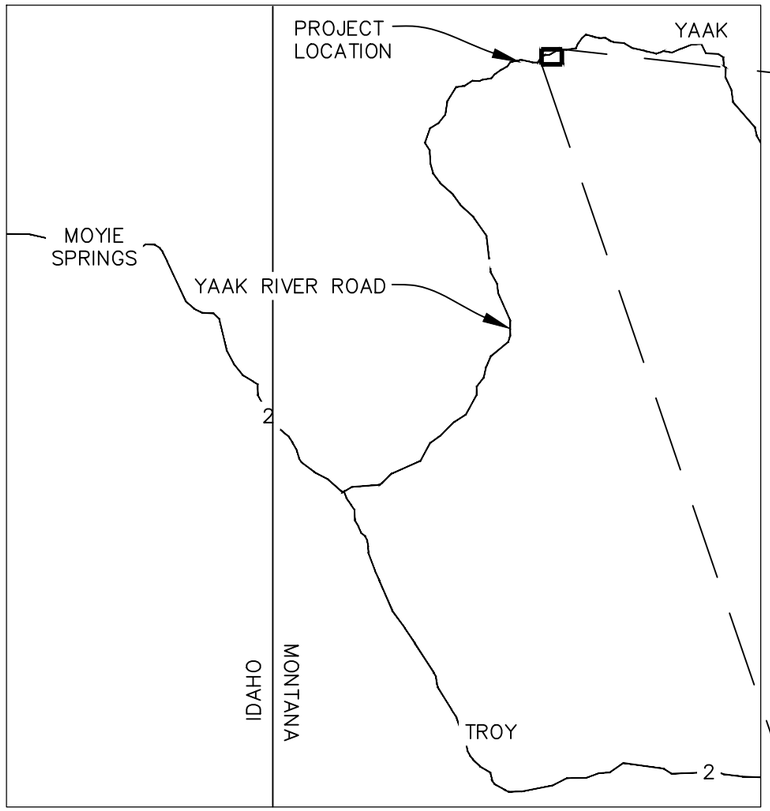
YAAK RIVER FLOODPLAIN RESTORATION

PROJECT OWNER PAUL BUNN

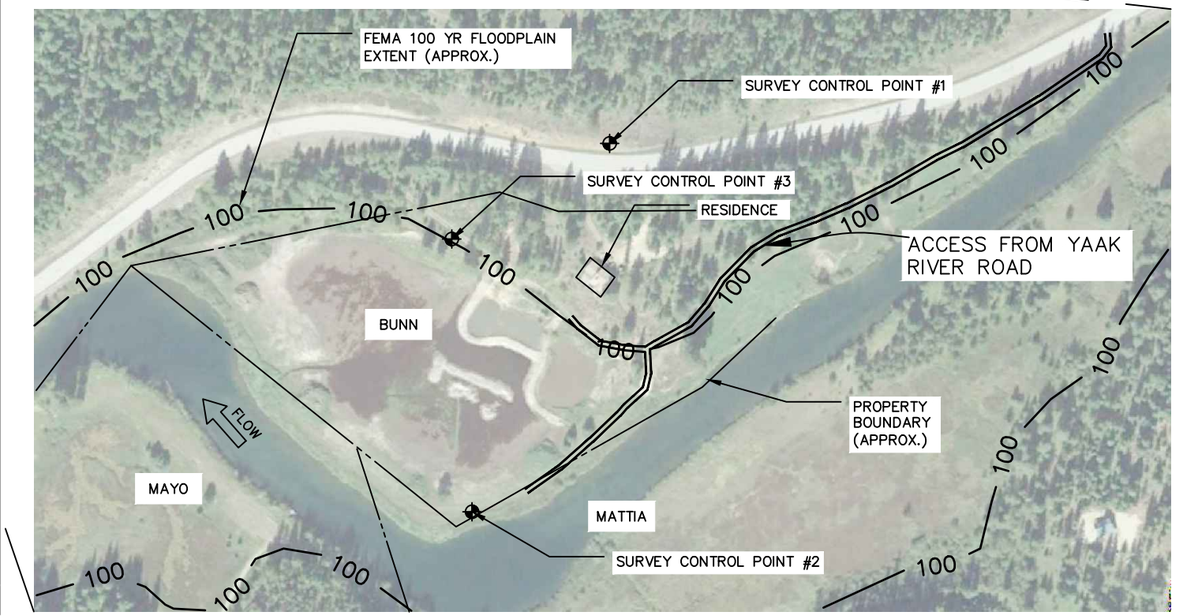
100% DESIGN

PLEASANT MEADOW
PARCEL ID 56471001201080000
T35N R33W S2
23500 YAAK RIVER ROAD

SHEET INDEX



VICINITY MAP



SITE MAP, ACCESS

300' 0 100' 200' 300'
SCALE: 1"= 300'

BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

MONTANA PAUL E. DEVRIES No. 61778 PE LICENSED PROFESSIONAL ENGINEER
MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

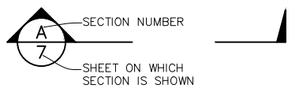
SHEET INDEX & LOCATION MAP
100% DESIGN

DATE: MAR 16, 2021
SHEET: 1
REV:

FILED IN: K:\2219 YaakRiver--Paul C Bunn Owner\DRAWINGS\yaak100PCT-NoMeadowFill.dwg SAVED: jschulz 3/16/2021 4:26 PM PLOTTED: Jim Schulz 3/16/2021 4:27 PM

DRAWING REFERENCES

THE DRAWINGS ARE REFERENCED IN THE FOLLOWING MANNER:
SECTION CUT ON SHEET 5, SHOWN ON SHEET 7:



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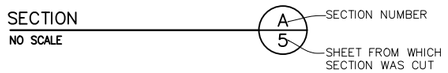


PLAN AREAS AND DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER.

LEGEND

2230	CONTOUR (EXISTING MAJOR)
2233	CONTOUR (EXISTING MINOR)
2230	CONTOUR (PROPOSED MAJOR)
2233	CONTOUR (PROPOSED MINOR)
OHW OHW	ORDINARY HIGH WATER LINE
100 100	100 YR FLOOD EXTENT
	ACCESS ROAD
	FENCE
OHP	OVERHEAD POWERLINE
SF SF	SILT FENCE
	GRAVEL
	UNDISTURBED EARTH / RIVERBED
	CUT
	FILL
	SURVEY CONTROL POINT

SURVEY NOTES

SURVEY HORIZONTAL DATUM FOR THIS PROJECT IS MONTANA STATE PLANE COORDINATES, NORTH AMERICAN DATUM NAD83; VERTICAL DATUM IS NAVD88. CONTROL POINT LOCATIONS SHOWN ON SHEET 3

SURVEY CONTROL POINT DATA

PROJECT CONTROL POINTS:	#1	#2	#3
POINT ID#	KED #100	KED #164	KED #169
NORTHING (FT)	1729763.04	1729033.92	1729573.72
EASTING (FT)	445772.29	445499.93	445459.71
ELEVATION (FT; NAVD88)	2917.47	2851.48	2864.18

ABBREVIATIONS

BM	BENCH MARK	H, HORZ	HORIZONTAL	OC	ON CENTER	V, VERT	VERTICAL
CL, ℄	CENTERLINE	HPA	HYDRAULIC PROJECT APPROVAL	OHW	ORDINARY HIGH WATER	W	WEST, WIDE
CP	CONTROL POINT	ID	IDENTIFICATION, INNER DIA	OHWL	ORDINARY HIGH WATER LEVEL	W/	WITH
CS	CROSS SECTION	L	LENGTH	RT	RIGHT	WM	WATER MARK
CY	CUBIC YARD	IN	INCH, INCHES	S	SLOPE, SOUTH	W/O	WITHOUT
DBH	DIA AT BREAST HEIGHT	LB	POUNDS	SHT	SHEET		
DIA	DIAMETER	LF	LINEAR FOOT	SP	STATE PLANE COORDINATES	WSEL	WATER SURFACE ELEVATION
DS, D/S	DOWNSTREAM	LS	LUMP SUM	SPEC	SPECIFICATION	WT	WEIGHT
DWG	DRAWING	LT	LEFT	STA	STATION	YR	YEAR
E	EAST	LWD	LARGE WOODY DEBRIS	STD	STANDARD		
EA	EACH	MAX	MAXIMUM	SF	SQUARE FOOT		
ELEV, EL	ELEVATION	MIN	MINIMUM	SY	SQUARE YARD		
ELJ	ENGINEERED LOG JAM	MISC	MISCELLANEOUS	TESC	TEMPORARY EROSION AND SEDIMENT CONTROL		
EMB.	EMBEDDED	MON	MONUMENT				
EXIST	EXISTING	N	NORTH	TYP	TYPICAL		
FT	FOOT, FEET	NO	NUMBER	U/S	UPSTREAM		
HIP	BPA HABITAT IMPROVEMENT PROGRAM	NTS	NOT TO SCALE	VAR	VARIES		

TABLE 1. SUMMARY OF QUANTITIES

ITEM	QTY	UNIT
CUT VOLUMES (BERMS, SPOILS PILES, INLET/OUTLET CHANNELS)	4,225	CY
CUT VOLUME (GRAVEL BORROW FROM HILLSIDE)	64	CY
FILL VOLUMES (PONDS)	525	CY
FILL VOLUMES (FLOODPLAIN)	2310	CY
AREA - OPEN WATER FEATURE	1511	SY
AREA - SEDGE/SPIKERUSH PLANTING ZONE (<EL 2844.7')	7160	SY
AREA - SWORDLEAF/SPIRAEA PLANTING ZONE (EL 2844.7'-2845.5')	13632	SY
AREA - SHRUB/TREE PLANTING ZONE (EL 2845.5'-2847.3')	3768	SY
AREA - DISTURBANCE BELOW OHW (EL 2847.3')	5.39	ACRE
AREA - DISTURBANCE ON LEVEE	0.3	ACRE
LOGS 10" DBH MIN 15' LONG	12	EA
SILT FENCE	185	LF

0 1"
BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

MONTANA
PAUL E. DEVRIES
No. 61778-PE
LICENSED PROFESSIONAL ENGINEER
MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

LEGEND, SURVEY DATUM, SUMMARY OF QUANTITIES
100% DESIGN

DATE: MAR 16, 2021
SHEET: 2
REV:

PLAN
CONDITIONS CA. SEPT 2014, BMPS
11
5

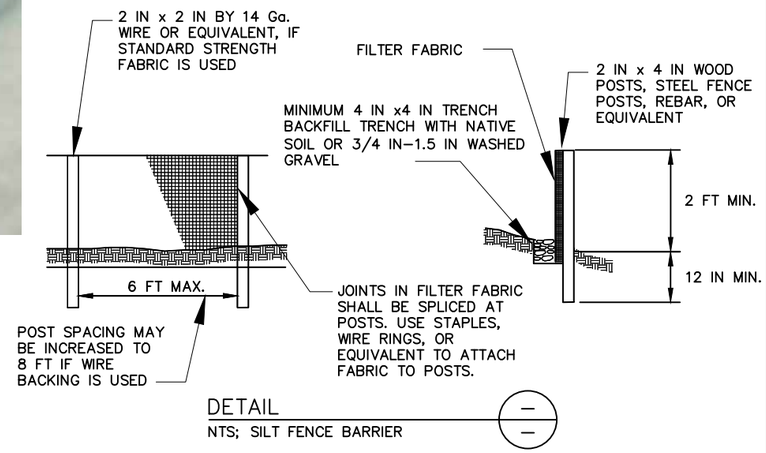
80 0 40 80
SCALE: 1"= 80'

TEMPORARY EROSION AND SEDIMENT CONTROL NOTES

1. THE IMPLEMENTATION OF THESE TESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE TESC FACILITIES SHALL BE REVIEWED AND SUPERVISED BY AN INDIVIDUAL WITH CESCL CERTIFICATION AND EXPERIENCE IN IMPLEMENTING TESC PLANS.
2. BOUNDARIES OF CLEARING LIMITS IN RIPARIAN VEGETATION AREAS SHALL BE CLEARLY FLAGGED WITH SURVEY TAPE BY ENGINEER PRIOR TO CONSTRUCTION; DURING CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE CLEARING LIMITS SHALL BE PERMITTED. THE CLEARING LIMITS SHALL BE MAINTAINED BY OWNER PROJECT MANAGER FOR THE DURATION OF CONSTRUCTION.
3. THE TESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED PRIOR TO OR IN CONJUNCTION WITH ALL CLEARING AND GRADING SO AS TO ENSURE THAT THE TRANSPORT OF SEDIMENT TO SURFACE WATERS, AND ADJACENT PROPERTIES IS MINIMIZED.
4. THE TESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR THE ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD THESE TESC FACILITIES SHALL BE UPGRADED BY CONTRACTOR AND APPROVED BY THE ENGINEER AS NEEDED FOR UNEXPECTED STORM EVENTS AND MODIFIED TO ACCOUNT FOR CHANGING SITE CONDITIONS (E.G., INSTALLATION/RELOCATION OF SILT FENCES, ETC.)
5. THE TESC FACILITIES SHALL BE INSPECTED DAILY AND MAINTAINED BY CONTRACTOR TO ENSURE CONTINUED PROPER FUNCTIONING.
6. THE TESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN 48 HOURS OF FOLLOWING A STORM EVENT.
7. WHERE TEMPORARY EROSION CONTROL IS REQUIRED, CERTIFIED WEED–FREE STERILE STRAW MULCH SHALL BE APPLIED AT A MINIMUM 2" THICKNESS.
8. EROSION CONTROL WILL MEET ALL LINCOLN COUNTY DESIGN AND CONSTRUCTION STANDARDS.
9. ALL DISTURBED AREAS SHALL BE SEEDED AT END OF CONSTRUCTION WITH NATIVE SEED MIX SPECIFIED IN NOTE 3, SHEET 7, AND A LIGHT MULCH COVERING SHALL BE APPLIED AS NEEDED.

SILT FENCE NOTE:

1. SILT FENCE SHALL BE USED FOLLOWING THESE SPECIFICATIONS:
   – FABRIC SHALL BE EQUAL TO "MIRAFI" WITH 100 LB GRAB TENSILE STRENGTH,
   – 200 PSI BURST STRENGTH, AND 70–200 SIEVE # APPARENT OPENING.



DETAIL
NTS; SILT FENCE BARRIER
—
—

0 1'
BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

MONTANA
PAUL E. DEVRIES
No. 61770 PE
LICENSED PROFESSIONAL ENGINEER
MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

EXISTING SITE & ACCESS PLAN, TESC 100% DESIGN

DATE: MAR 16, 2021
SHEET: 3
REV:

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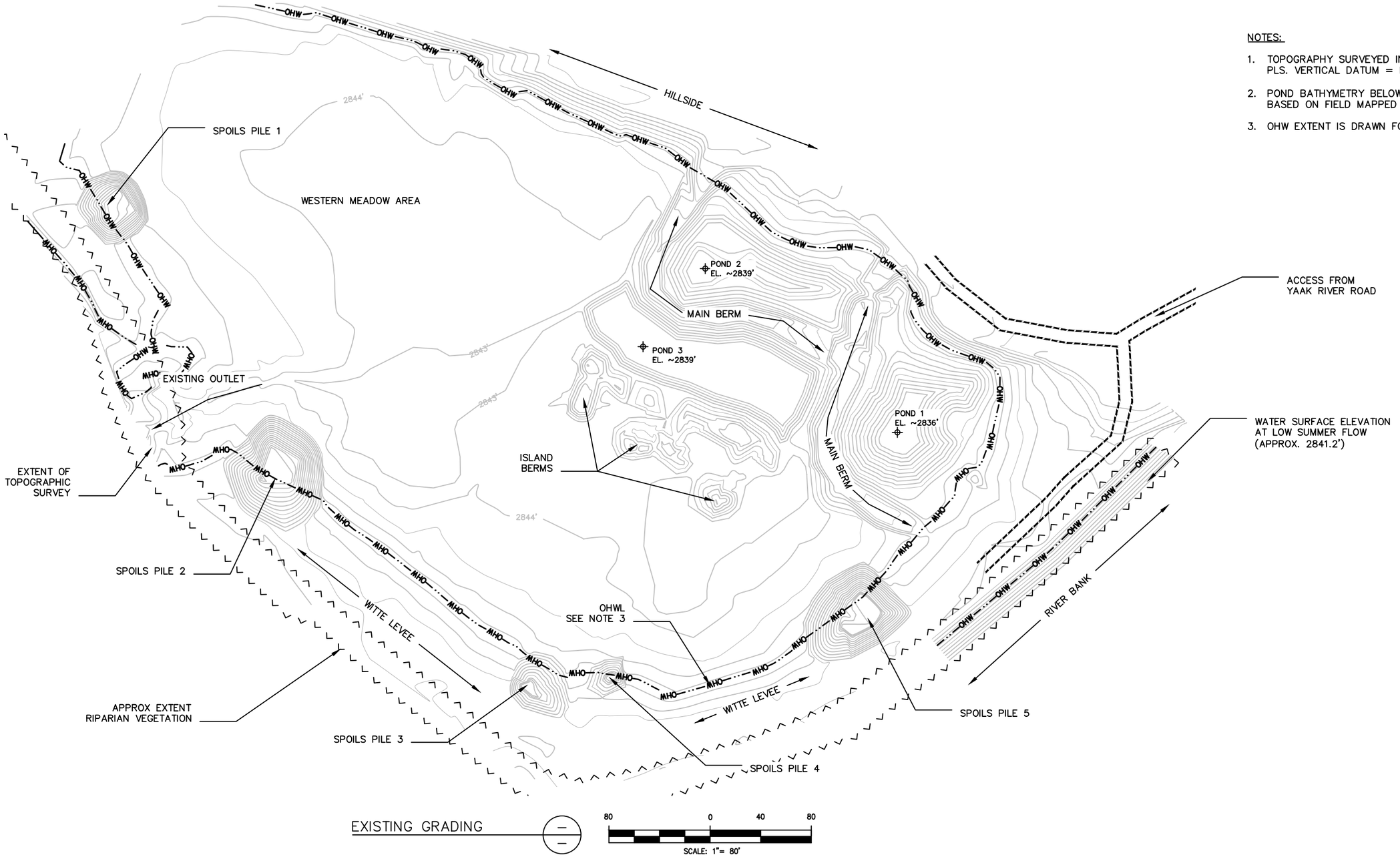
NOTES:

1. TOPOGRAPHY SURVEYED IN OCTOBER 2018 BY LICENSED PLS. VERTICAL DATUM = NAVD88
2. POND BATHYMETRY BELOW ELEV. 2844' IS APPROXIMATE, BASED ON FIELD MAPPED SOUNDINGS
3. OHW EXTENT IS DRAWN FOR EXISTING CONDITIONS.



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0 1"
BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

MONTANA
PAUL E. DEVRIES
No. 61770-PE
LICENSED PROFESSIONAL ENGINEER
MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

EXISTING GRADING
100% DESIGN

DATE: MAR 16, 2021
SHEET: 4
REV:

FORM VARIOUSLY LOCATED AND SIZED, DISTINCT MOUNDS IN RANDOM PATTERN IN GENERAL AREAS INDICATED ON THIS PLAN; SEE NOTE 2.7.

SCALP TO MATCH SURROUNDING TERRAIN

SURVEY CONTROL POINT #3 SEE NOTE 1

CONTOUR CUT TO MATCH SURROUNDING TERRAIN

APPROX. LOCATION OF WELL, SEE NOTE 1

SCALP MAIN BERM TO ELEV 2845'

CONTOUR CUT TO MATCH SURROUNDING TERRAIN

FILL POND 3 TO ELEV 2844' W/ 20H:1V SLOPE UP TO TOP OF BERM CUT SEE NOTE 2.5

SCALP MIN 40 FT LONG SECTION OF MAIN BERM TO ELEV 2843.5'

PLACE REED CANARY GRASS MATERIALS; SEE SHEET 6

SCALP ISLAND BERMS TO ELEV 2844'

FILL DEPRESSION TO APPROX ELEV 2843'; SEE NOTE 2.6

CUT 3' WIDE OUTLET NOTCH TO ELEV 2843.7'

SCALP TO MATCH SURROUNDING TERRAIN

OHWL

FILL DEPRESSION TO APPROX ELEV 2843.5'; SEE NOTE 2.6

TOP OF BANK

SCALP TO MATCH SURROUNDING TERRAIN

CONTOUR CUT TO MATCH SURROUNDING TERRAIN

SCALP TO MATCH SURROUNDING TERRAIN

SURVEY CONTROL POINT #2 SEE NOTE 1

10' WIDE ACCESS ROUTE

GRADING PLAN — 1/5 — INLET CUT

SCALE: 1"= 20'

GRADING PLAN

SCALE: 1"= 80'

ACCESS ROAD

2H:1V

MAINTAIN ACCESS, PLACE ROCK AS NEEDED

8H:1V

3'

NOTES:

1. PROTECT WELL HEAD AND SURVEY CONTROL POINTS WITH ORANGE CONSTRUCTION FENCING.
2. ORDER OF EXCAVATION AND FILL:
   - 2.1. MOW SPOILS PILES AND BERMS AROUND PONDS, COMPOST CLIPPINGS OFFSITE.
   - 2.2. AS SOON AS PRACTICABLE, EXCAVATE AT OUTLET TO FACILITATE DRAINAGE WITHOUT AFFECTING RIVER WATER QUALITY.
   - 2.3. SCALP BERMS AROUND PONDS AND SPOILS PILES. SET ASIDE (I) TOP 1 FT SURFACE LAYER OF SPOILS PILES WITH REED CANARY GRASS ROOTS, AND (II) MATERIAL WITH DISTINCT TEPHRA STRATUM.
   - 2.4. PLACE REED CANARY GRASS MATERIAL IN POND 1; COVER WITH 0.5 FT THICK LAYER OF SALVAGED TEPHRA MATERIAL, 0.5 FT THICK LAYER OF SALVAGED SOIL MATERIAL. COVER TOP OF FILL WITH 0.5 FT THICK LAYER OF GRAVEL. SEE SHEET 6 FOR ADDITIONAL DETAILS.
   - 2.5. FILL POND 3 FIRST WITH REMAINING SALVAGED TEPHRA MATERIAL, COVER WITH REMAINING BERM CUT, INLET CUT, AND SALVAGED SOIL MATERIAL. ALL LIFTS 1 FT MAX, COMPACT ALL BUT SURFACE LIFT FIRM WITH EXCAVATOR BUCKET.
   - 2.6. FILL DEPRESSION AREAs SOUTH AND SOUTHWEST OF POND 3 WITH LOOSE SALVAGED SOIL MATERIAL TO FACILITATE SURFACE WATER DRIANAGE TOWARDS OUTLET.
   - 2.7. PLACE REMAINING SALVAGED SOIL MATERIAL INTO VARIOUSLY SIZED 1 FT TO 2 FT HIGH MOUNDS W/ APPROX. 3H:1V SIDE SLOPES. DISTRIBUTE MOUNDS PER DIRECTED WORK BY ENGINEER, IN CONSULTATION WITH EPA/DOJ EXPERT, LEAVING AN AREA UNFILLED TO DRAIN BETWEEN OPEN WATER FEATURES AND OUTLET. USE WETLAND MATS AS NEEDED FOR HEAVY EQUIPMENT ACCESS ACROSS MEADOW AREA.
   - 2.8. CUT UPSTREAM HIGH FLOW RIVER INLET THROUGH WITTE LEVEE TO POND 1, AND CUT OUTLET NOTCH
3. TARGET GRADE ELEVATIONS ARE APPROXIMATE (+/– 0.2 FT)

BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

PAUL E. DEVRIES No. 61778 PE LICENSED PROFESSIONAL ENGINEER MONTANA

MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

GRADING PLAN
100% DESIGN

DATE: MAR 16, 2021
SHEET: 5
REV:

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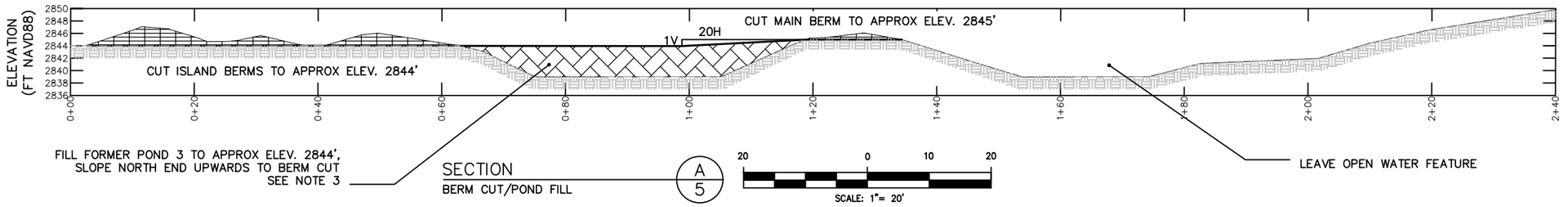

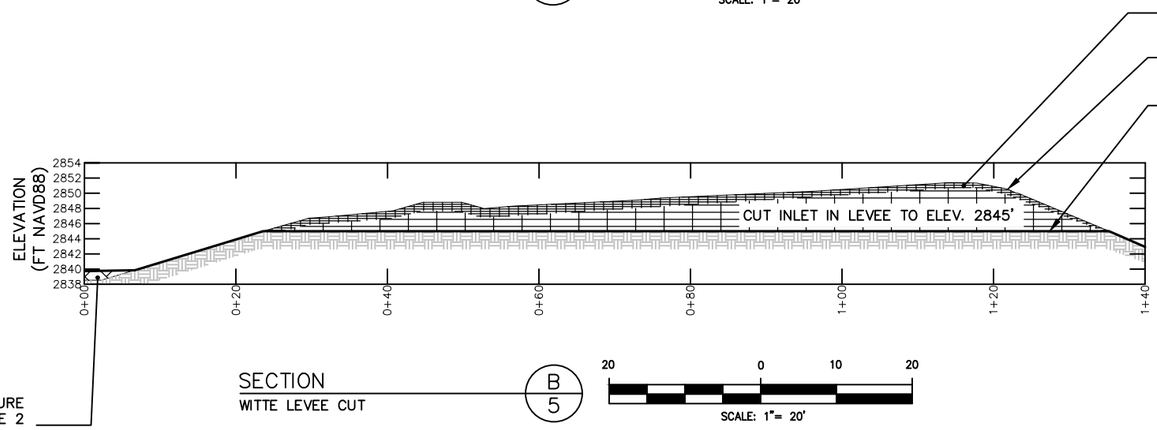

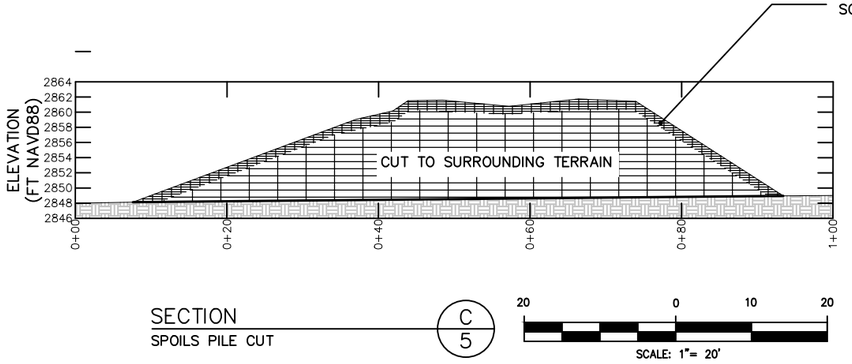

NOTES:

1. SCALP 1 FT SURFACE COVER OF SPOILS PILES AND INLET CHANNEL CUT TO BELOW REED CANARY GRASS ROOTS/RHIZOMES, STOCKPILE FOR PLACEMENT AS FILL INTO PONDS.
2. PUMP WATER FROM POND 1 BEFORE PLACING REED CANARY GRASS ROOT/RHIZOME LAYER SALVAGED FROM SPOILS PILES. COVER WITH 0.5 FT LAYER OF SALVAGED SOIL FROM BERMS OR SPOILS PILES. COVER WITH MINIMUM 0.5 FT LAYER OF GRAVEL BORROWED FROM ADJACENT HILLSLOPE AT LOCATION APPROVED BY OWNER.
3. PUMP WATER FROM POND 3, PLACE ALL SALVAGED TEPHRA MATERIAL FIRST, THEN COVER WITH SALVAGED SOIL.

0 1"
BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

MONTANA
PAUL E. DEVRIES
No. 61770 PE
LICENSED PROFESSIONAL ENGINEER
MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

GRADING SECTIONS
100% DESIGN

DATE: MAR 16, 2021
SHEET: 6
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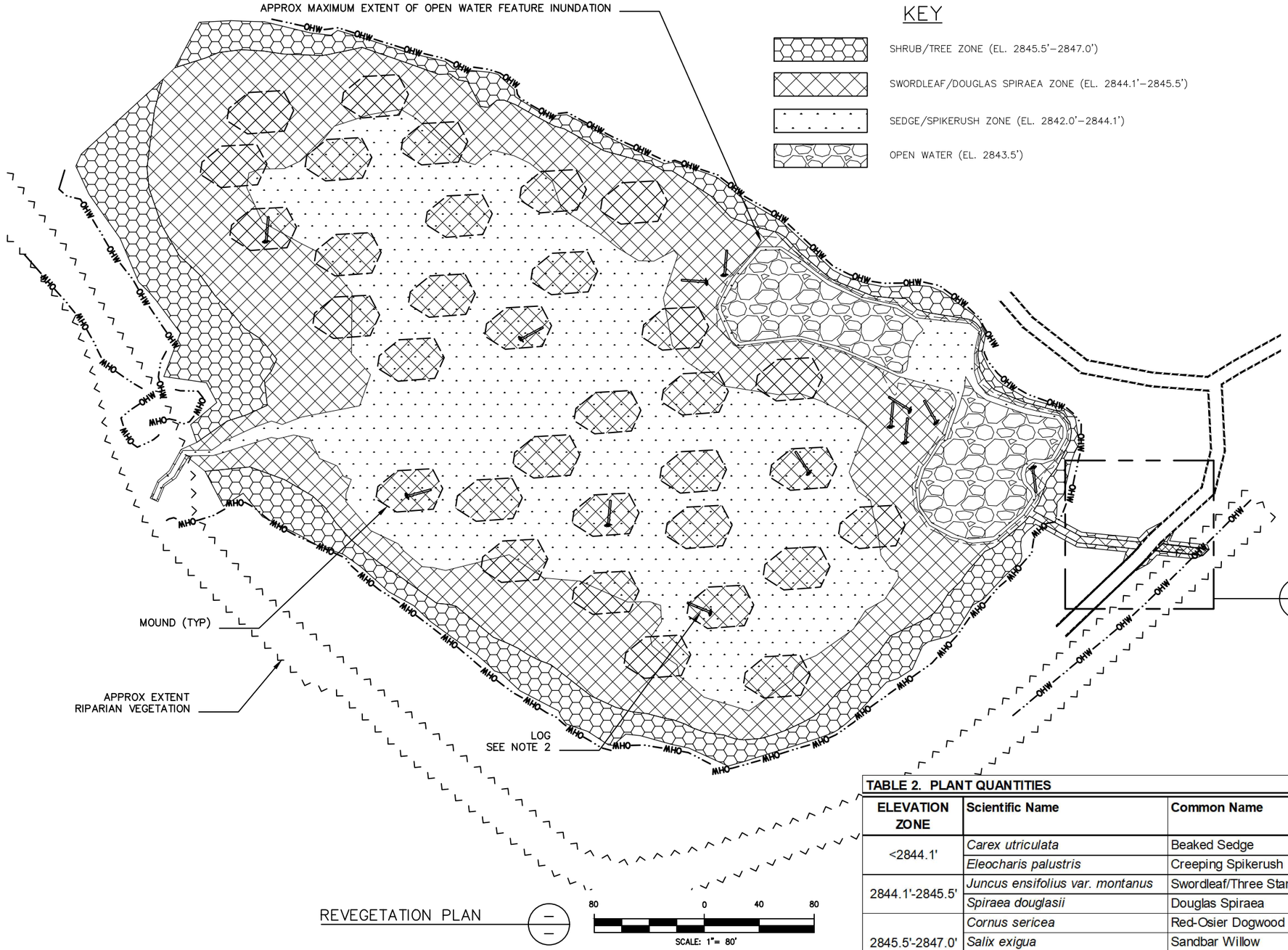
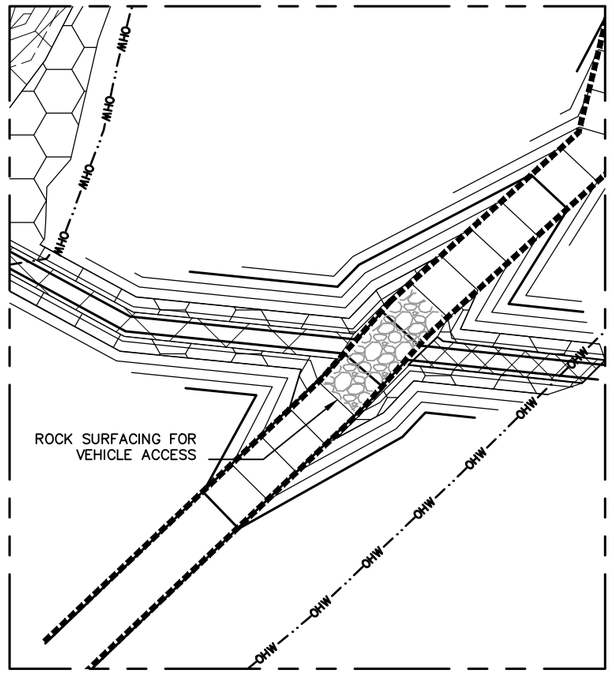


REVEGETATION PLAN



PLANTING PLAN
INLET CUT
2/7

30 0 15 30
SCALE: 1"= 30'

NOTES:

1. SEE TABLE 2 FOR PLANTING ELEVATIONS. MIX SHRUB AND TREE SPECIES IN PATCHES WITHIN PLANTING ZONE.
2. DISTRIBUTE TWELVE (12) SEASONED CONIFER LOGS WITH OR WITHOUT ROOTWADS, MIN DIAMETER 10 INCHES, MIN LENGTH 15 FT, SALVAGED FROM TREE FALL OFF–SITE, PLACE WITHIN SWORDLEAF/SPIRAEA ZONE AND AT SELECTED MOUNDS AT DIRECTION OF OWNER REPRESENTATIVE. DISTRIBUTION AS DEPICTED IS SUGGESTED.
3. USE APPROVED NATIVE SEED MIXES OVER BARE SOIL AREAS INCLUDING IN THE SWORDLEAF/SPIRAEA ZONE, WITH SPECIES AND APPLICATION RATES AS RECOMMENDED BY A LOCAL CONSERVATION BIOLOGIST, APPROPRIATE TO HYDROLOGIC ZONE.

TABLE 2. PLANT QUANTITIES

ELEVATION ZONE	Scientific Name	Common Name	Plant Material	On-Center Spacing (ft)	Total No.
<2844.1'	*Carex utriculata*	Beaked Sedge	Plugs/Bare Root	3	3580
	Eleocharis palustris	Creeping Spikerush	Plugs/Bare Root	3	3580
2844.1'-2845.5'	*Juncus ensifolius var. montanus*	Swordleaf/Three Stamened Rush	Plugs/Bare Root	3	6816
	Spiraea douglasii	Douglas Spiraea	Container/2-foot live cuttings	3.5	5008
2845.5'-2847.0'	*Cornus sericea*	Red-Osier Dogwood	Bare root seedlings	4	1060
	Salix exigua	Sandbar Willow	Bare root seedlings	4	1060
	Spiraea douglasii	Douglas Spiraea	Container/2-foot live cuttings	12	74
2846'-2847.0'	*Alnus incana ssp. Tenuifolia*	Mountain/Speckled Alder (or equivalent)	Container	12	74

0 1"
BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

MONTANA
PAUL E. DEVRIES
No. 61770 PE
LICENSED PROFESSIONAL ENGINEER
MAR 16, 2021

PAUL BUNN, OWNER

DESIGNED BY: P. DEVRIES
DRAWN BY: P. DEVRIES
CHECKED BY: T. LINDSEY
PROJECT MGR: P. DEVRIES
FILENAME:

Resource Consultants, Inc.
REDMOND, WA.

YAAK RIVER FLOODPLAIN RESTORATION
NORTHWESTERN MONTANA

REVEGETATION, PLAN, & SITE RESTORATION
100% DESIGN

DATE: MAR 16, 2021
SHEET: 7
REV:

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APPENDIX B

T. Lindsey Report on Large Wood

General Observations of Yaak River Wetlands Wood Material Occurrences

As part of the Bunn site restoration design plan, proposed enhancements to the floodplain wetland restoration have included the addition of large wood objects to create more diverse and complex habitat. This memo serves to document various occurrences of wood types along nearby areas in the Yaak River valley. Although no large wood was present on the Bunn site in recent years (Figure B-1), creation of this component will be consistent with other similarly-located wetlands.

Observation of satellite images, along with several select on-the-ground photos, provides reasonable comparative examples to inform Bunn-site recommendations.

Figure B-1. September 2012 satellite image. View is to the south from Bunn site, across river to opposite-side floodplain wetlands.

SPREAD POND AREA

Reference locations (Figure B-2) in the Spread pond area include the pond itself; a seasonally open water feature upstream, across the river; a higher flow regime meander bend upstream of Spread pond; and a river-bank cut and adjacent wetland floodplain across the river and immediately downstream of the Bunn site.

Figure B-2. Reference image showing general Spread pond area immediately downstream from Bunn. View perspective is down-river, to the west. Image date, July 2014.

Spread pond, located less than one mile downstream from Bunn site, is a good example of a year-round open water feature. Viewing satellite images over several years, it appears that there have been up to a dozen visible logs and large wood debris objects around the perimeter of the open water (Figure B-3). Some of the logs are not firmly attached and float from time-to-time as evidenced by the variable location of logs in sequential satellite images.

Figure B-3. Spread pond, September 2014. Satellite image shows locations of several logs and wood debris scattered around the perimeter of this open-water feature. Viewing several images acquired in previous years, indicates that most logs are stationary, but some float and move seasonally.

During a field inspection in late 2019, several photographs (Figures B-4 – B-6) were taken which show the position of select logs at that time (including a recent tree-length blow-down with limbs). At ground level there are partially submerged logs and wood pieces nestled in the heavy brush which are not clearly visible on the satellite images.

Figure B-4. Ground-level photograph of west-end of Spread pond. Encircled area displays two perimeter logs resting sub-parallel to open water edge. November 2019; view to south.

Figure B-5. South view of mid-Spread pond. Encircled wood material (mostly log pieces) around perimeter. November 2019.

Figures B-4, B-5, and B-6 illustrate a number of woody objects, all located around the perimeter of the open water Spread pond.

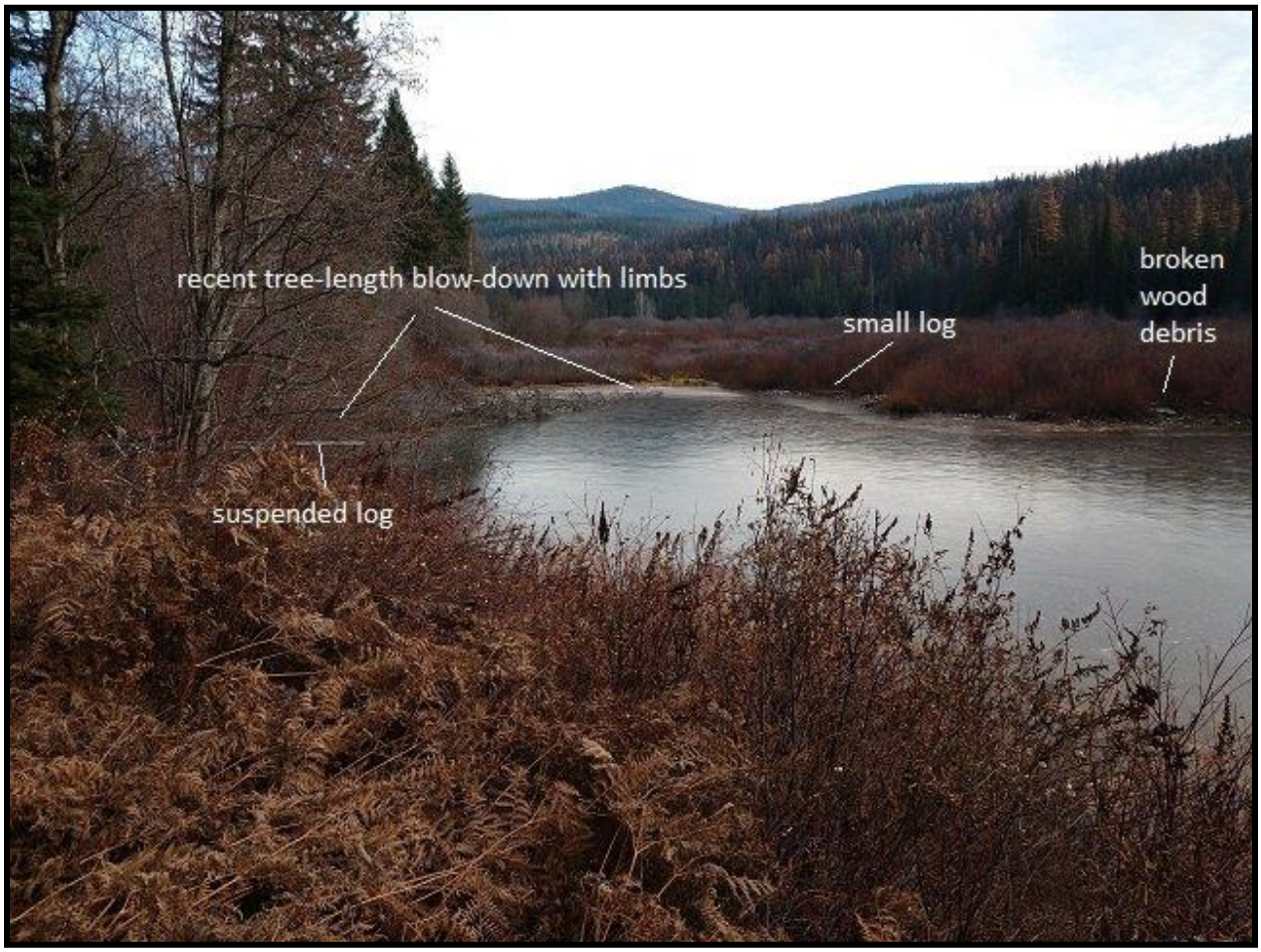

Figure B-6. Up-valley, east view. Wood objects include logs and debris along opposite open water perimeter as well as oblique blow-downs along foreground edge. Note recent tree-length blow-down with limbs. November 2019.

Across the river from Spread pond (see reference Figure B-2) is a seasonally open water area that also contains a few scattered logs which appear to be blow-downs from the adjacent hillside. A photo (Figure B-7) from the road on that side of the river illustrates the size and relative position. Since the open-water areas do not receive amounts of surface water sufficient to float and transport the logs, they are ordinarily perpendicular; or, at an oblique angle to the hillside from which they fell.

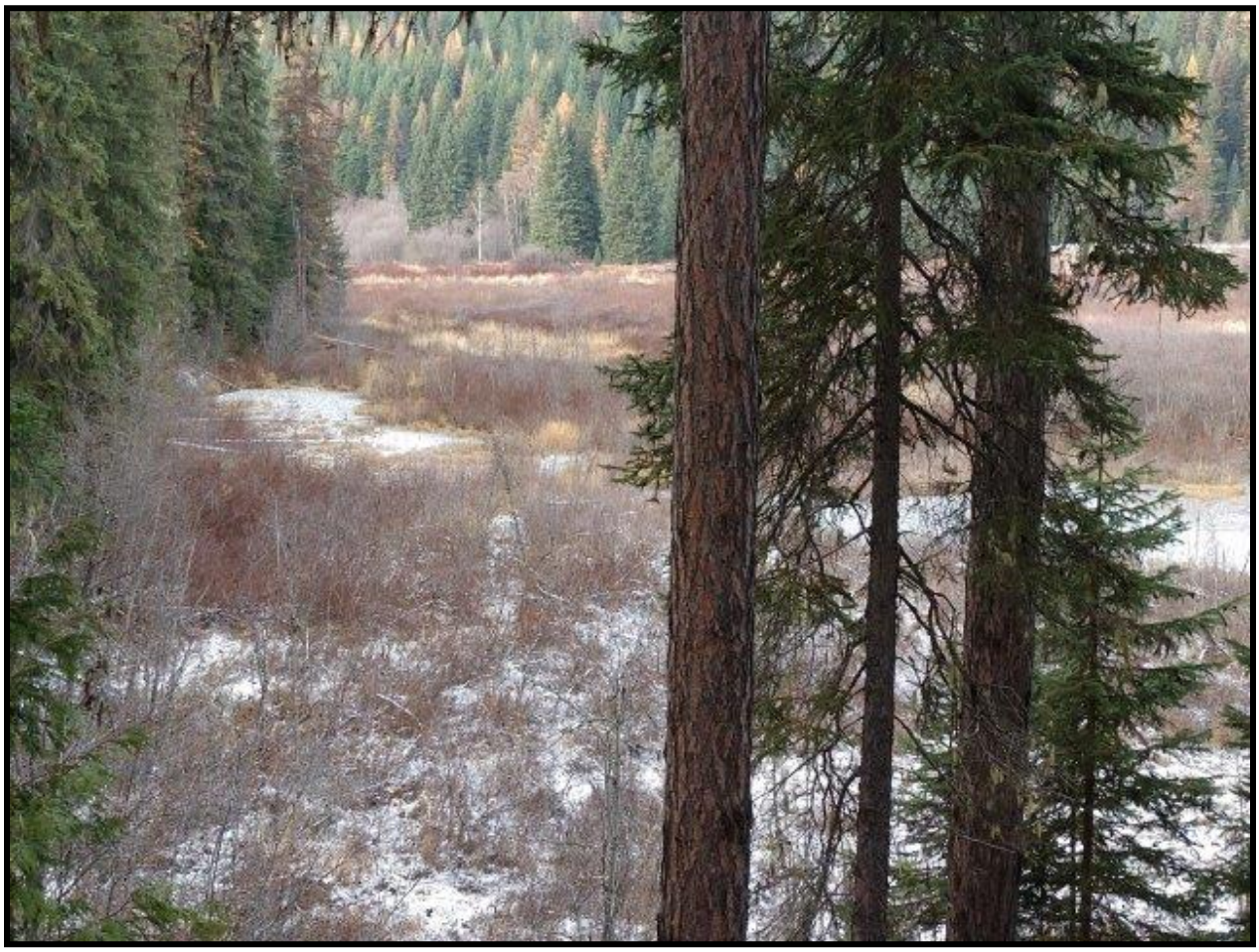

Figure B-7. Seasonally open water feature across river from Spread pond. View is down-river direction. Note scattered blow-down logs from the upland to the base of slope wetland. November 2019.

On the meander river bend, located just upstream of Spread pond, below the Mayo bridge (Figure B-8), logs carried by the river during flood stage are shown to have lodged near the head of two cut-off channels (A and B in Figure B-8). At the outer, downstream curve of the bend, a cluster of river drift logs are shown strewn sub-parallel to the stream flood direction (Figure B-8, C). One of the larger logs appears to have been rafted onto the floodplain at the river bank; another, appears to have been carried into a seasonally open-water feature (D in Figure B-8). Although these examples of large wood debris are transported in a higher gradient flow regime and may not be expected on the elevated floodplain along the low-gradient reaches which characterize the Bunn site, the size and orientation of wood may help in considering the planform of channel-type material during restoration.

Figure B-8. Various river-rafted logs shown (A, B, C, D) along portions of meander bend. July 2014 satellite image.

Immediately upstream of the Mayo river-bridge; and, across the river, downstream of the Bunn site, is a wetland floodplain connected to the river by a river-bank cut. Figure B-9, is a satellite image illustrating semi-submerged, anchored logs along the Yaak River, submerged river "lunker" logs, and a floodplain log lying across the bank channel cut.

Figure B-9. July 2014 satellite reference image. Wetland floodplain is located immediately across, and downstream, of the Bunn site…indicated by Witte outlet annotation.

The photograph in Figure B-10 shows the river-bank cut and footbridge (annotated in Figure B-9) across the river, downstream of the Bunn site.

Figure B-10. Southeast view from Yaak River Road shows river-bank channel cut and floodplain log. Late April 2019 photo was taken in higher river flow time before highest flood levels. Semi-submerged anchored river log is barely visible as a surface ripple on right, down-river.

Figure B-11 is a zoomed photograph image taken from the Yaak River Road looking across the river at the bank cut, channel, and seasonally open-water wetland. The photo displays a "chunk" of wood debris in the bank-cut channel and a fallen log.

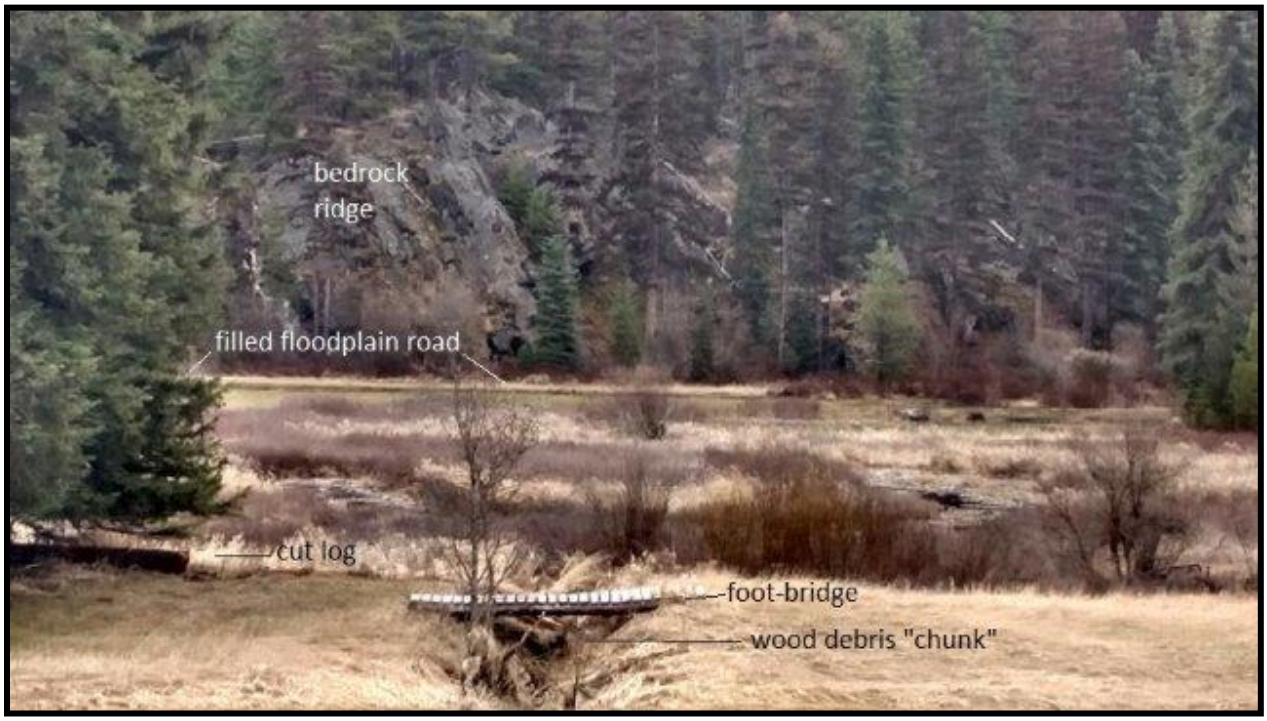

Figure B-11. April 23, 2019 photo illustrates two types of wood material on the floodplain. Wetland area is seasonally open water. Reference location shown in Figure 9.

ELK POINT AREA

Elk Point, located less than two miles upstream from the Bunn site, is an excellent reference site for wood material in a meadow/open-water channel wetland complex. The reference satellite image (Figure B-12) shows the position of several large pieces of wood distributed throughout several areas of the complex.

Figure B-12. Elk Point complex reference image. July 2013 down-river, west, is at top.

Figure B-13 is a zoomed satellite image illustrating the size and position of a log located near the head of the open-water channel feature.

Figure B-13. Encircled log on perimeter of open water is likely sourced from local blow-down from adjacent upland.

The photo in Figure B-14 is a ground-level view toward the up-valley head of the Elk Pt open water channel complex (Figure B-13) and provides an example of large wood material.

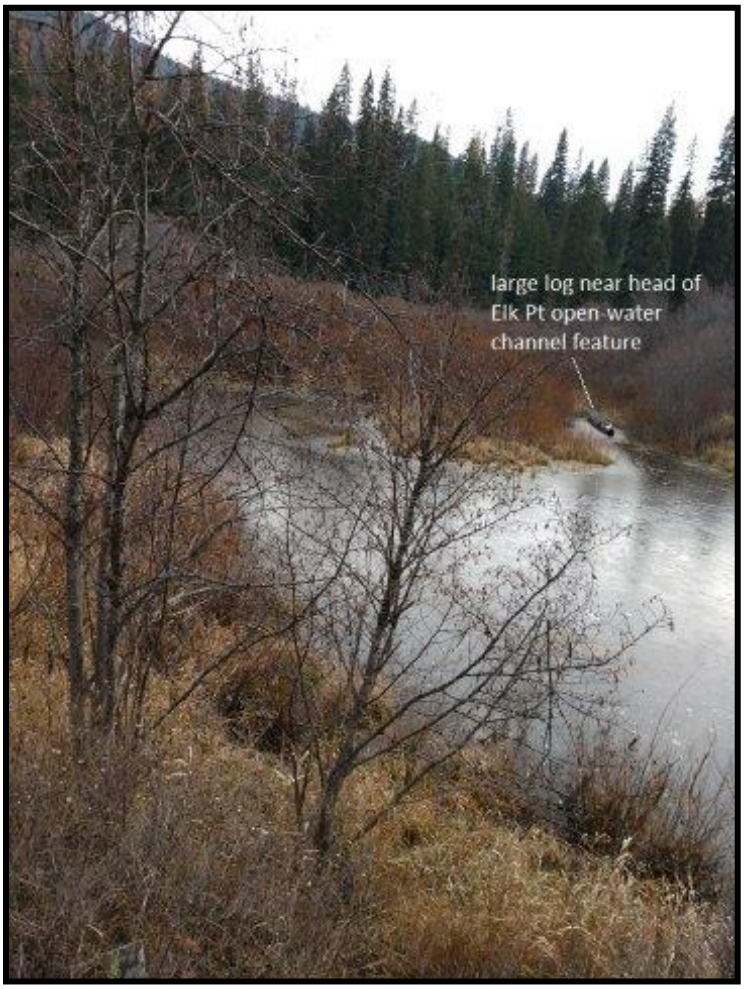

Figure B-14. November 2019 photo illustrates "floater-type" log oriented in long direction of open-water channel feature.

Figure B-15 is a zoomed satellite image demonstrating fallen trees from the upland into the open water channel feature. Broken pieces of these blow-down trees contribute log sources and debris to the base-of-slope feature

Figure B-15. Lower end of Elk Point meadow/channel complex.

The predominant wood source for the Elk Pt open-water channel feature is likely from broken trees which are periodically blown down from the adjacent hillside. The photo in Figure B-16 illustrates several blow-downs along the middle reach (encircled area in Figure B-15) of the Elk Point open water.

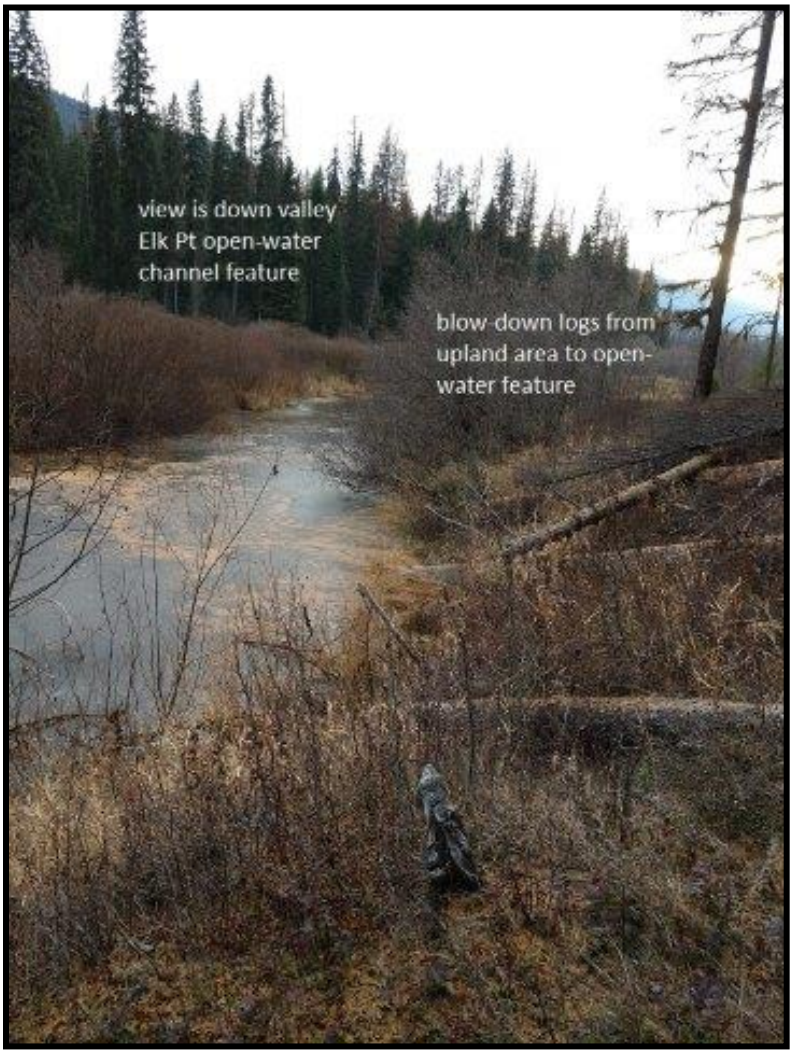

Figure B-16. November 2019 photograph along Elk Point meadow/channel complex. Log pieces from fallen upland trees create more complex habitat.

The last four photos in Figures B-17 – B-20 are miscellaneous examples of other Yaak Valley wood objects noted in the project photo library:

Figure B-17. Wood debris near outlet of Yaak Meadows subdivision County park reserve semi-permanent open-water feature.

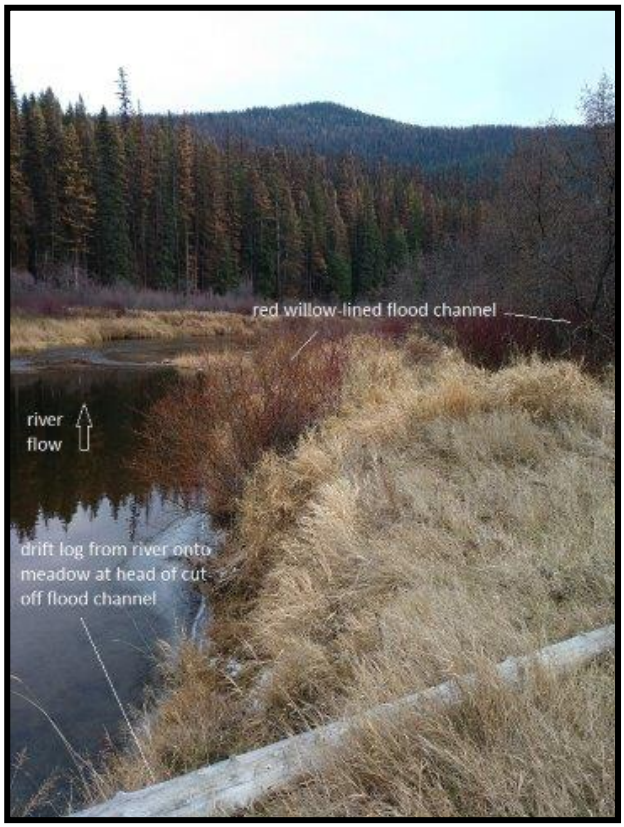

Figure B-18. Large river drift log flood-rafted onto meadow above periodic flood channel. South of Elk Pt complex.

Figure B-19. Typical upland wet meadow. Blow-down trees into wetland.

Figure B-20. River drift log from So. Fork Yaak River on streamside of So. Fork header pond berm. View up SFY River.

SUMMARY OF OBSERVATIONS

Distribution of large wood objects within floodplains of the Yaak River are quite varied. In general, the large meadow areas ordinarily contain broken tree-piece logs along the upland boundary where wind-blown and lightening-strike trees have fallen into the meadow. In cases where seasonally open-water areas develop within the wetland floodplain, these waters may float some of the debris which then becomes foundered in various orientations. Year-round open water features are shown to have a mix of floated wood pieces collecting sub-parallel and along the perimeter of the open water; and also, oblique fallen trees (logs) from adjacent uplands. The Yaak River itself is capable of transporting larger wood material, but these logs ordinarily are blocked from entering the floodplains except at high flow flood cut-off channels. The lower ends of flood channels may also collect out-flowing debris. The Bunn site prior to the 2013 excavation did not contain any large logs. This was likely due to the historical dredging and maintenance of the Witte fish pond operations. Additionally, the original public road bed and right-of-way in the 1920-30s was likely cleared of mature trees during construction and maintenance. The Witte drainage ditch does not exhibit a flowing current capable of transporting large debris into the meadow. Since the historical road right-of-way is now fairly heavily in-grown with mature trees, this can be modeled as a source for the wetland floodplain wood objects. Mature fir and spruce trees currently growing along the Witte-era elevated river berm/levee are also good source models for the simulated scattered wood features.

CONCEPTUAL DISTRIBUTION OF WOOD MATERIALS: BUNN SITE

Utilizing observations of wood occurrences within the Yaak valley wetlands and floodplains, a reasonable design to enhance the overall nature of the Bunn restoration plan can be envisioned as shown in Figure B-21. This is a conceptual design and would be revised or augmented in the field as the final grade and microtopography are completed. As shown it includes wood material along the inlet channel; sub-parallel wood along the lower side of the open-water channel; oblique tree logs lying partially submerged on the upland side of the surface waters; simulated blow-down along the upland road bed; “stranded floaters” partially anchored on select micro-topog mounds within the meadow; log material aligned sub-parallel with the outlet swale; and perpendicular-to-oblique log-type objects along the re-graded Witte river-berm. Smaller debris (not shown) could be placed in select areas based on final vegetation cover.

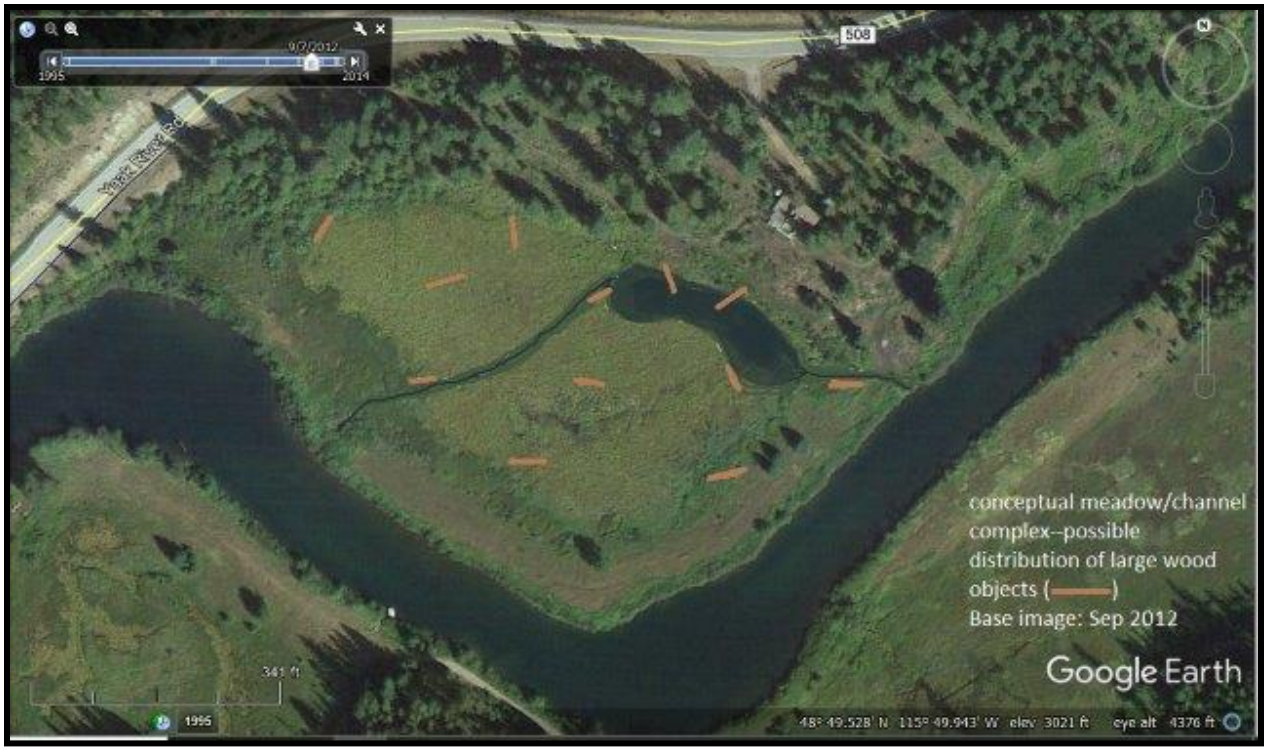

Figure B-21. Conceptual view of wood material distributed across restored Bunn site. This image was created with Microsoft Paint program utilizing the September 2012, satellite image as a background. The proposed upstream inlet channel is shown; along with, the open-water channel feature and outlet swale to the downstream river drainage notch.

APPENDIX C

Monitoring Approach and Criteria

Table C-1. Summary of Project Targets, Project Standards, Measurement Methods, Success Criteria and Recommended Contingency Measures.

WATERS/ WETLAND FUNCTION	PROJECT TARGETS	PROJECT STANDARDS, IMPLEMENTATION PROCEDURES	MEASUREMENT METHODS	SUCCESS CRITERIA	RECOMMENDED FIRST RESPONSE CONTINGENCY MEASURES
HYDROLOGIC	Enhance hydrologic connections between the channel system and adjacent floodplain waters/wetlands	Excavate new inlet through historic Witte levee near upstream end of floodplain	As-built topographic survey	Invert elevation matches design (2845' navd88)	N/A – complete specified grading
	Maintain historic standing water in emergent meadow waters/wetlands in spring/summer; the water should gradually recede in late spring and summer	Lower previous outlet control elevation by approximately 1 ft	Photographic documentation at established control points; Documented elevation of outlet channel hydraulic control	Standing water gradually recedes in late spring/ summer	N/A – No Artificial Interference Recommended
	Restore wetlands topography to average, gently sloping grade elevations; Establish microtopographic complexity emulating conditions at nearby reference sites prior to excavation	Scalp main berms to Elev 2845' and island berms to Elev 2844' Fill Pond 3 and adjacent areas of floodplain to Elev 2843.5'-2845' Create complex microtopography by: constructing randomly sized and distributed mounds to Elev 2844'- 2845' Place large wood pieces across floodplain and around perimeter of restored area to emulate natural wood transport and deposition processes	As-built topographic survey and photographic documentation of installed structures, plant survey (see below)	Achieve design grades; Documented spatial variability in microtopography and plant species Established Plant Community resembling ecological reference sites	N/A – complete specified grading See Plant Community contingency measures below

Table C-1. Summary of Project Targets, Project Standards, Measurement Methods, Success Criteria and Recommended Contingency Measures.

WATERS/ WETLAND FUNCTION	PROJECT TARGETS	PROJECT STANDARDS, IMPLEMENTATION PROCEDURES	MEASUREMENT METHODS	SUCCESS CRITERIA	RECOMMENDED FIRST RESPONSE CONTINGENCY MEASURES
	Restore subsurface low transmissivity layer in excavated pond 3 area	Replace concentrated tephra material as a layer in lower elevations of pond fill	Photographic documentation during construction	Reduced rate of groundwater expression and seepage from Pond 3 footprint	N/A – Increase groundwater expression over historic levels may be beneficial for sustaining floodplain vegetation
BIO-GEOCHEMICAL	Water quality suitable for amphibian habitat in open water channel feature	Aquatic life observed using open water feature	Visual observation, grab samples of water temperature, pH, dissolved oxygen during summer months	Conditions similar to analogous open water features in reach, supports adjacent wet meadow conditions	Evaluate effectiveness of groundwater source, ensure adequate water source
	Natural sedimentation processes continue or are enhanced by increased connectivity	Fine sediment deposition observed after river backflow through outlet during periodic spring flooding	Photographic documentation of sediment conditions	Deposition observed	N/A – Reach scale process

PLANT COMMUNITY	Establish and maintain a mosaic of native forested, scrub-shrub, and emergent wetland vegetation to the restored waters/wetland ecosystem Preserve and protect select areas demonstrating current natural recovery of native vegetation	% vegetative cover of native plant species is ≥ 50 % after year 2, ≥75% after years 3 and 4, and ≥90% by year 5 Survival of plants installed >90% after Year 1, for each species Invasive and noxious species shall be limited to ≤10% of total canopy cover in years 3-5 >50% of dominant plant species across all strata are rated FAC, FACW, or OBL by year 5 No bare mineral soil areas will exceed 50 ft^2 Avoid earthwork disturbances over select areas of the floodplain; apply LEDPA principles to avoid and minimize adverse effects	Field examination and photographs; qualitative field surveys/mapping of recovery zones, where two methods of measurement will be implemented: 1. One permanent transect will be installed across center of floodplain, including western meadow area. Point line plant community cover types (emergent, scrub-shrub, forested) will be measured along the entire length of the transect; 2. Three (3) individual 1/100 acre plots will be placed randomly within each planting zone type, and will include at least one of the mounds in the western area of the floodplain. At each plot measure (a) plant stem density, (b) number of plant community strata, (c) percent cover of native/non-native species, and (d) detritus depth Dominance test per USACE's 1987 Wetlands Delineation Manual & Western Mountains Regional Supplement	Best efforts result in reasonable vegetation community similar to nearby reference sites Significant areas of the current floodplain are retained as a natural recovering base for new wetland vegetation planting/seeding	Replant areas if necessary to meet success criteria; if one species does not thrive, identify and plant replacement species; utilize diverse seeding to allow adaptable species to support long-term maintenance If necessary, use a combination of mechanical weed control measures and EPA approve herbicide treatments to control non-native invasive or noxious weeds Earthwork construction monitored in progress; field level revisions and adaptive management if necessary to minimize impacts

Table C-1. Summary of Project Targets, Project Standards, Measurement Methods, Success Criteria and Recommended Contingency Measures.

WATERS/ WETLAND FUNCTION	PROJECT TARGETS	PROJECT STANDARDS, IMPLEMENTATION PROCEDURES	MEASUREMENT METHODS	SUCCESS CRITERIA	RECOMMENDED FIRST RESPONSE CONTINGENCY MEASURES
FAUNAL HABITAT/ SUPPORT	Emulate open water areas, Plant community structure, and faunal habitat features found in reference system waters/wetlands within the Yaak River Watershed Establish and maintain a mosaic of native forested, scrub-shrub, and emergent wetland vegetation to the restored waters/wetland ecosystem	Partially fill Pond 1 to approx. Elev 2840' with reed canary grass, cover with gravel armor layer, maintain water depth for aquatic habitat freeze protection; add large wood pieces Fill Pond 3 and remainder of floodplain to Elev 2844'-2845' Place large wood pieces around restored area to emulate natural wood transport and deposition processes Plant native species and maintain vigor and survival as described in the Plant Community section above	As-built topographic survey, photographic record from established control points documenting conditions in Pond areas 1, 2, and 3 Photographic records/documentation of log placement and conditions Vegetation measures as in the Plant Community section above Note faunal species use of the restoration area	Grading Standards are met Microtopographic features and large wood features are in place and functioning to add complexity to faunal habitats Documented Wildlife faunal species uses of diverse, complex waters/wetlands areas within the restoration area	N/A – complete specified grading and large wood placement Use Plant Community contingency measures as listed above